User Guide Version 6.1

Volume I: Installing MICRESS

"Resolution of partial differential equations is more about art than science".
Apocryphal quotation from Numerical Recipes in Fortran

"2 + 2 = 4 except for large values of 2"
Anonymous

"42"
Douglas Adams

This volume has been edited 2013 by the MICRESS group.

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1 Introduction

The software MICRESS® (MICRostructure Evolution Simulation Software) is developed for time- and space-resolved numerical simulations of solidification, grain growth, recrystallization or solid state transformations in metallic alloys. MICRESS® covers phase evolution, solutal and thermal diffusion and transformation strain in the solid state. It enables the calculation of microstructure formation in time and space by solving the free boundary problem of moving phase boundaries.

The microstructure evolution is governed essentially by thermodynamic equilibria, diffusion and curvature. In case of multicomponent alloys, the required thermodynamic data can either be provided to MICRESS® in the form of locally linearized phase diagrams, or by direct coupling to thermodynamic data sets via a special TQ interface, developed in collaboration with Thermo-Calc™ AB, Stockholm.

MICRESS® is based on the multi-phase-field method which defines a phase-field parameter for each of the phases involved. The phase-field parameter describes the fraction of each phase as a continuous function of space and time. Each single grain is mapped to a distinct phase-field parameter as well and is treated as an individual object in the microstructure. A set of coupled partial differential equations results, which describes the evolution of the phase-field parameter along with concentration, temperature, stress and flow fields. The total set of equations is solved explicitly by the finite difference method on a cubic grid. 2D and 3D simulations are possible. The size of the simulation domain, the number of grains, phases and components is restricted mainly by the available memory size and the CPU speed.

Your suggestions or comments for improvements of the manual are highly welcome via e-mail to documentation@micress.de.

MICRESS® handles:

1-, 2- and 3-dimensional calculation domains

- arbitrary number of components, phases and grains
- solid-solid and solid-liquid interactions
- anisotropy of grain boundaries, mobility and energy

MICRESS® supports:

- coupling to thermodynamic database (via the TQ-interface of Thermo-Calc™)

The present **MICRESS® User Guide Volume 1: MICRESS Installation** comprises:

- an overview of the different options when purchasing MICRESS
- a step-by-step explanation of installing the software for Windows and Linux

- a description how to set up the license server
- a short description how to verify a successful installation

MICRESS® User Guide Volume 0: MICRESS Phenomenology

provides a description of the phase-field phenomenology and more details about the theoretical background of MICRESS.

MICRESS® User Guide Volume 2: Running MICRESS

provides a targeted and user- oriented description of the data pre-processing for the simulations and a detailed review of specific MICRESS features .

MICRESS® User Guide Volume 3: Post-processing

explains several possibilities for analyzing, converting and documenting MICRESS results.

MICRESS® User Guide Volume 4: Examples

contains a collection of examples for simulations performed on various topics.

2 What you should have got

2.1 Procuring MICRESS®

After having placed an order for MICRESS® and signing the MICRESS® End User License agreement following items should have been sent to you by Access or one of its agents:

- the software package (either as a CD or by download)
- one or two license files (two in case of the TQ coupled versions MICRESS “research TQ” and MICRESS “professional”)

The present chapter ‘What you should have got’ details the two delivery options for MICRESS®. Furthermore, general information about the license file – including an exemplary picture of the license file explaining the meaning of its several elements, like Host-IDs, licensed feature and the licensed version or the license expiry date – will be given.

The first option of receiving MICRESS® is getting a CD of the software by mail, Figure 2.1:

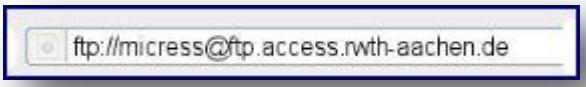
Figure 2.1 Physical shipment of a CD comprising MICRESS®

MICRESS® can also be downloaded from an ftp site as an ISO image of the CD. Both, CD and ISO image have identical content. The downloaded *.iso file should be opened using a CD/ DVD burning software and then be burned to CD.

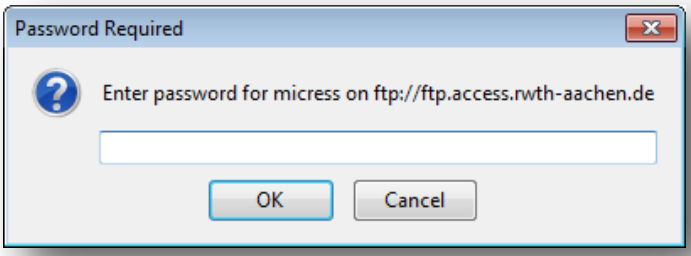
Downloading the ISO image:

a) Use your usual browser and enter the following ftp- address:

ftp://micress@ftp.access.rwth-aachen.de (not preceded by any 'www.')



b) A prompt window will appear asking for the password. This password will be provided by e-mail by Access or by one of its authorized agents.



c) Open the folder 'MICRESS_RELEASES'. In this folder you will find subfolders for a couple of the latest releases. In the folder with the highest version number you will find the *.iso images of the latest MICRESS® version. The subfolders starting with "Binaries" contain not archived files available on the latest *.iso image (presently version 6.100).

It is not necessary to install the Thermo-Calc software TQ interface separately when having procured MICRESS® with TQ interface. This procedure is executed by default.

2.2 The license files

MICRESS® typically is installed in a network consisting of a license server and clients in a number of IP domains. The license server provides the link between the client and its license file. Chapter 3 “Setting up the license server” will provide detailed instructions about setting up and running the license server.

For a standalone installation of MICRESS®, the installation of a license manager is not necessary (see Client installation).

There are two different license files. Depending on the actual installation either one or both are required.

d) A license type requiring only one FlexNetPublisher (FlexLM) license file. This holds for MICRESS® versions without coupling to thermodynamic data via the TQ interface i.e. MICRESS® “Research” and MICRESS® “Education”

e) A license type requiring two license files, resp. one FlexLM license file for MICRESS® and one Safenet Sentinel license file for the TQ interface. This holds for MICRESS® versions *with* coupling to thermodynamic data via the TQ interface i.e. MICRESS® “Research-TQ” and MICRESS® “Professional”

Both types of license files will be provided by Access or by one of its authorized agents. A typical FLEXlm license file is shown in Figure 2.2:

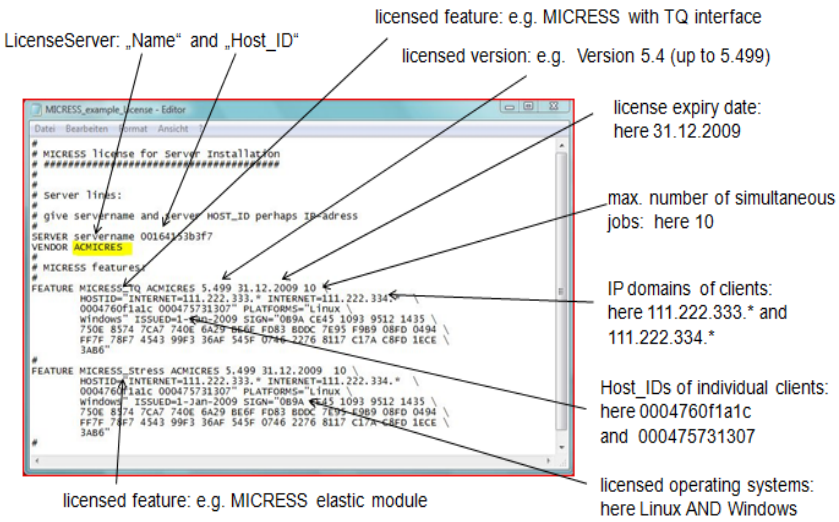


Figure 2.2 Illustration of a license file with the vendor ACMICRES (i.e. Access e.V., Aachen, Germany)The arrows indicate the specific meaning of a term or a value.

The license files contain information about:

- **Name and Host-ID of the license server** (see chapter 3)
- **Information about the vendor** (see chapter 3)
- **The licensed feature** details the different options being licensed. Typical features are “MICRESS” for the non-TQ coupled version, “MICRESS_EDU” for the restricted educational version, “MICRESS_TQ” for the TQ-coupled versions and “MICRESS_Stress” in case the elastic module is included
- **The licensed version** describes the actual version the client may use. All versions with version IDs smaller than the indicated version may be run using this license file. The given example allows to run any MICRESS version elder than version 5.4.
- **The license expiry date** indicates the duration of the license. In general even permanent licenses are automatically renewed annually and thus have an expiry date, unless the customer explicitly requests a “never” for this expiry date.
- **The number of leases** shows how many MICRESS jobs can be run simultaneously in the given network. Each job being started in the network receives a lease –or token- from the license server unless the number of leases is not exceeded.
- **The IP domain(s).** The IP number of the client plays a role when getting a license token from the license server. The IP number of the client has to be in the range being specified in the license file
- **The licensed operating system options** are Linux or Windows. In newer MICRESS releases Windows and LINUX are both licensed automatically. This option is thus omitted in more recent license files
- **The Host-ID of a specific client.** Each client has a certain ethernet address. In special cases, the license file may allow for a lease to a specific client (characterized by its Host-ID) even if it has no IP in the specified range of IP-addresses.

Starting with MICRESS® version 6.0 and TQ interface version S, Thermo-Calc Software uses the Safenet Sentinel license system (see license file example in Figure 2.3).

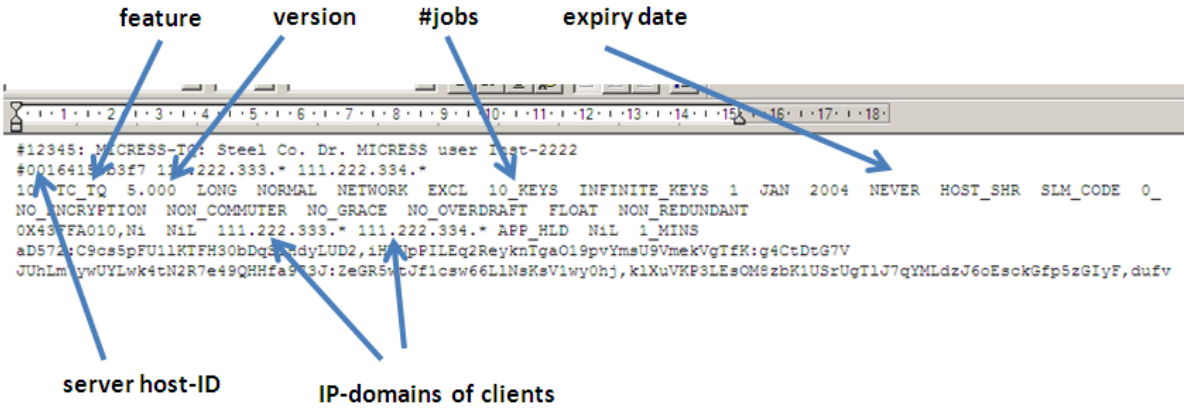


Figure 2.3 Safenet Sentinel license file

To enable Access to issue a license file some information about the license server and the network of the clients is required. In detail this information comprises:

- name of the license server
- operating system of the license server
- IP-Address of the license server
- Host-ID of the license server
- IP domains of the clients (up to six domains of type 111.222.333.*)

In general this information has been requested by Access or one of its agents well before and if you already have the license file, you can start to set up the license servers as described in the following chapters. Please note/check, that the license server must have an IP within domains being specified for the clients.

2.3. System requirements / version variants

For the MICRESS® Release Version 6.1 the following platforms are supported

- Windows XP / Windows 7
- SUSE Linux Enterprise, resp. OpenSUSE (Version 10 up to 11.x)
- RedHat 4 based distributions

The Release 6.100 includes MICRESS® 32 and 64 bit serial and parallel versions. A GNU Compiler Suite 4.4 as a standard is necessary on all Linux systems.

As suitable hardware configuration for MICRESS® simulations we recommend either a PC (for starters), preferably with a quad-core CPU of the current series, and min. 4 GB RAM. For multiple instances of MICRESS running on the same system, a workstation or server with more CPUs and higher memory bandwidth is recommended. After setting the parameters "real" MICRESS simulations may take a few days and even more. Be aware that this computer is busy during that time and that the hardware is sufficiently reliable to operate continuously for days. In particular it should be noted that MICRESS® runs only on x86 compatible processors, i.e. standard Intel or AMD processors and not on other processor architectures such as PowerPC, Itanium or others. Generally speaking, the faster the CPU, the better. Plenty of memory (4 GB minimum, preferably more) is strongly recommended. MICRESS, especially for 3D simulations, needs much memory. Therefore, the provided 64 bit versions of MICRESS are the best choice for large simulation settings.

The versions of MICRESS which made use of thread level based parallelization benefit from multicore architectures with relatively low CPU counts, i.e. 8 or 12 CPUs in a system.

The MICRESS capabilities are the same for both operating systems and the respective executables are all in “double precision”. In the following, the variants for version 6.1 are presented - including their disadvantages and advantages when deciding in favor of one of them.

MICRESS TQS x64 (standard version)

This will be the standard version and the basis for all future developments. In a 64 bit installation, a copy of this binary will be made to 'MICRESS'.

Pros:

- larger address space, i.e. more addressable main memory enables more complex simulations

Cons:

- requires a 64 bit operating system
- requires GES5 files being created with Thermo-Calc version TCC-S (64 bit), only!
  TCC-R or Thermo-Calc 3.0 GES5 files are incompatible.

Recommendation: If you have a 64 Bit operating system and the version of TCC-S, you should use this version.

MICRESS_par_TQS_x64

Parallelized diffusion, stress, and temperature solvers (thread level based, shared memory systems). See also MICRESS_TQS_x64.

Pros:

- Simulations with high loads in the parallelized solvers are accelerated.

Cons:

- requires multicore systems
- Generated overhead for parallelization slows down the simulation when there is only few load in the parallel solvers.

MICRESS TQS x32

In a 32 bit installation, a copy of this binary will be made to 'MICRESS'.

Pros:

- allows use of TQS features in a 32 bit environment

Cons:

- smaller address space
- TCC-S (32 bit) made GES5 files have to be used

MICRESS par_TQS x32

In a 32 bit installation, a copy of this binary will be made to 'MICRESS' (see also MICRESS_TQS_x32 and MICRESS_par_TQS_x64).

MICRESS_noTQ_x32, MICRESS_par_noTQ_x32, MICRESS_noTQ_x64, MICRESS_par_noTQ_x64
All these variants are *without* Thermo-Calc coupling.

3 Setting up the license server

"Setting up the license server" provides hints to the configuration of the license server allowing to install and to run MICRESS® on the client computers in the network being specified in the license file. This operation in general is performed by the system administrators and not by the MICRESS users. If you plan to use a standalone license, you can skip this chapter and continue with chapter 'Client installation'.

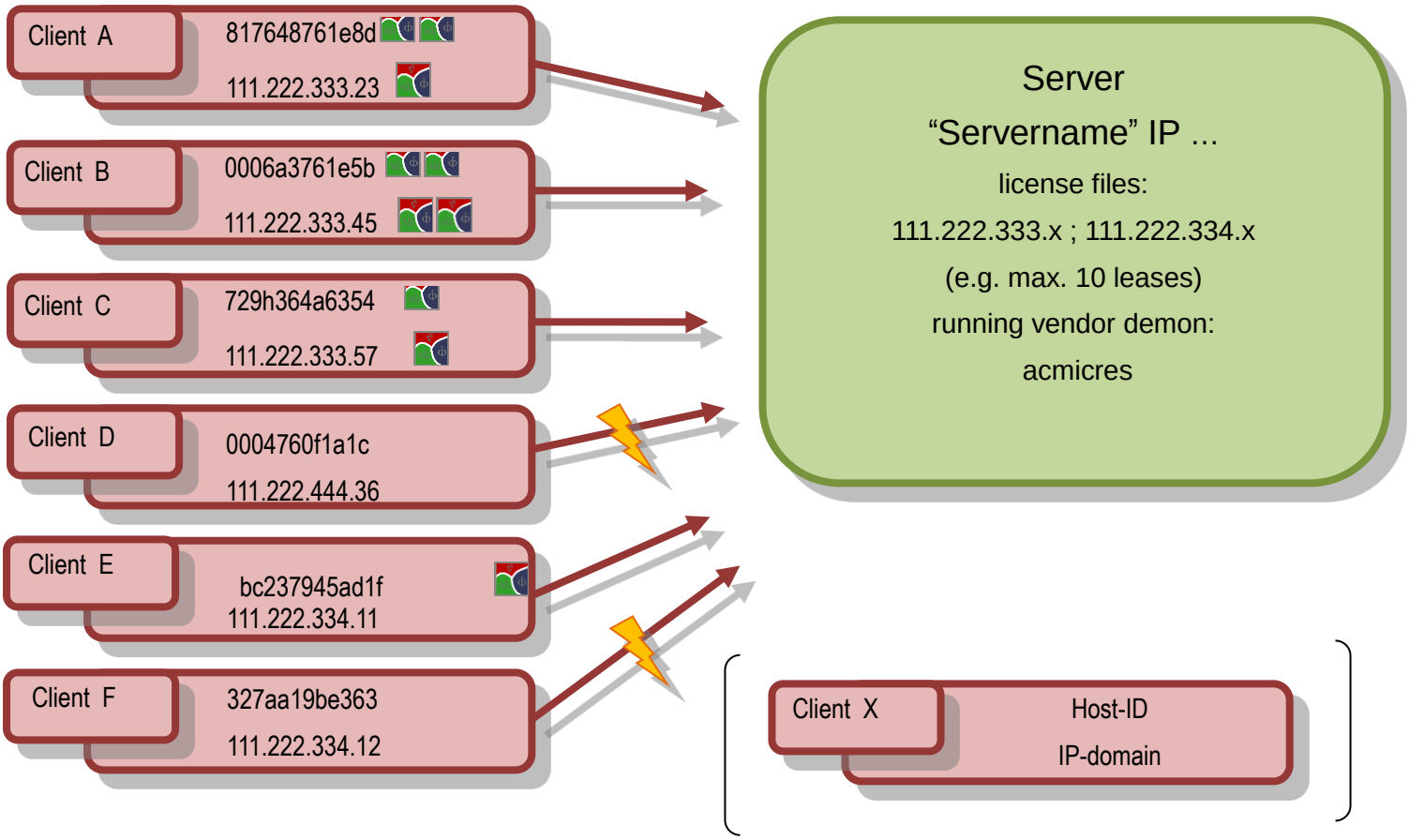
To set up the license server, it is recommended to install MICRESS® also on the license server. This procedure is similar to the installation on the individual clients. Please refer to chapter 4 'Installing MICRESS on the clients'.

The MICRESS® license is based on the FlexNetPublisher (FLEXlm) and all details about this licensing system can be found in the FLEXNet licensing end user guide (see chapter5 "The MICRESS directories"). Starting with MICRESS version 6.1, Thermo-Calc software makes use of another license server system: Safenet Sentinel. The installation of this license service is also explained in this chapter.

The present chapter thus is meant as a quick-start reference describing the basic steps to be taken to set-up the license servers. After a schematic overview of the FLEXlm license system, chapter 3.1, a short description of the graphical front-end of the FLEXlm system, the *lmtools.exe*, is given followed by details of the individual steps to be taken for installing the license server under Windows. The installation of the FLEXlm system with Linux/Unix will be introduced as well. Furthermore, the installation procedure of the Safenet Sentinel license system for both Windows and Linux/Unix will be detailed.

Successful installation on server and/or clients can be verified using some examples as detailed in chapter 6.

3.1 Schematic Overview of the FLEXlm system



- The license server with name “Servername” run the vendor demon acmicres and monitors the active number of MICRESS job leases.
- Client B runs four jobs, which can be performed because its IP number fits to the IP range specified in the license file.
- Client D does not get a lease because the license server monitors it as an invalid client with an IP address outside the IP range specified in the license file.
- In case the maximal number of leases is exceeded the server does not dispense any further lease – even if a client has a valid IP address. This client has to wait until a lease is returned from another client. Client F thus does not get a lease.
- Special case: If the actual Host-ID of a client is explicitly included in the license file, its IP number may be outside the IP-range specified in the license file.

3.1.1 Setting up the FLEXlm license server under Windows

The first step of setting up the license server is to locate the license system directory and the graphics- front end "lmtools.exe", Figure 3.1:

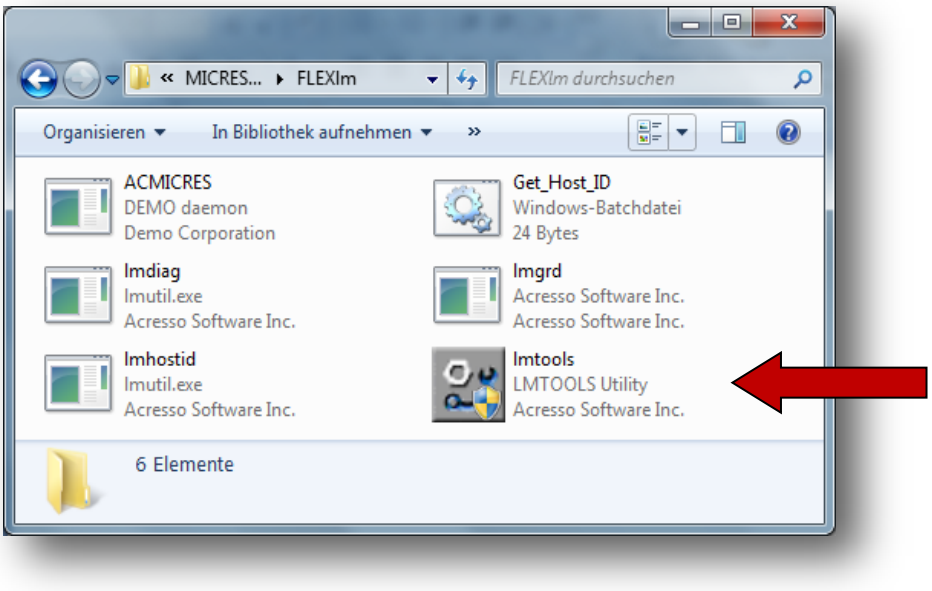


Figure 3.1 lmtools – your key to the license server manager

The individual files in the FLEXlm directory are itemized below:

- **lmtools.exe** is a graphical user interface to the license server manager. It performs functions like starting, stopping and configuring FLEXnet license server systems or getting information like the Host-ID.
- **ACMICRES.exe** is the vendor demon for the MICRESS license file. The vendor demon, the license server manager (lmgrd) and the license file form the entire software of the license server system.
- **Get_Host_ID** is the tool needed to retrieve the Host-ID.
- **Host_ID_name**. In this '.txt' document the Host-ID is saved by the 'Get_Host_ID'.
- **lmdiag** , the diagnostic tool, lists each license lease and serves for debug purposes. It may display problems or identify successful license checks.
- **lmgrd** is the license server manager. The license server manager and the vendor demon add up to the entire license server system that provides the license leases.

After double clicking on lmtools.exe, the lmtools window will appear, see Figure 3.2. To continue, hit the tab 'Config Services' leading to Figure 3.3.

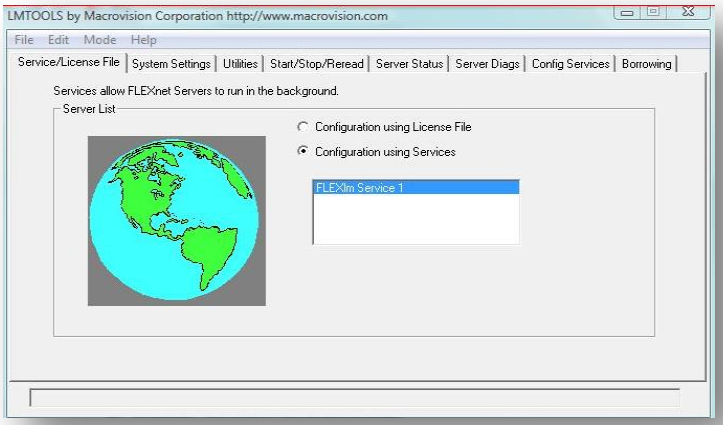


Figure 3.2 The basic task bar of lmtools

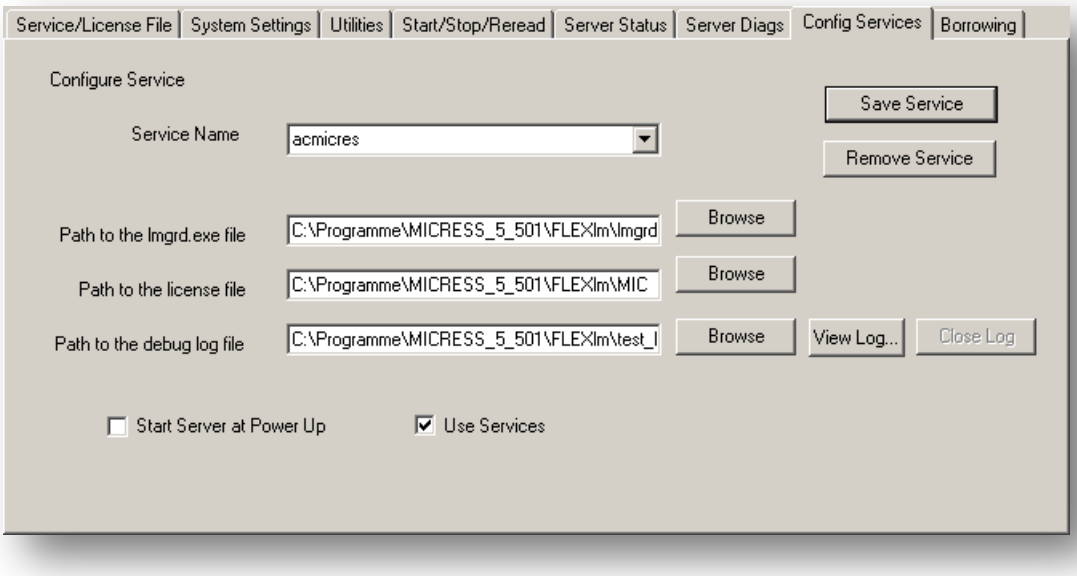


Figure 3.3 After specifying the service name (acmicres), enter correct paths to lmgrd.exe, to the license file and to the log file.

In the 'Config Services' menu several paths have to be set:

- **Service Name:** specify the name of the service here (e.g. acmicres).
- **Path to the lmgrd.exe file:** enter the correct path to the lmgrd.exe being located in the FLEXlm directory (see Figure 3.1)
- **Path to the license file:** enter the path to the license file
- **Path to the debug log file**: enter the path to the debug log file. The respective file will be created during runtime.

To specify different file locations, make sure that a fully qualified path is specified. Once the paths are set, please click on 'use services' and optional 'Start Server at power up' and then 'Save Service'. Switch to the 'Start/Stop/Reread' tab, pick the service you have just saved and start it. For verification, it is useful to click on the 'Server Diags' and to check if the server works correctly, see Figure 3.4, **Error! Reference source not found.**, and **Error! Reference source not found.**.

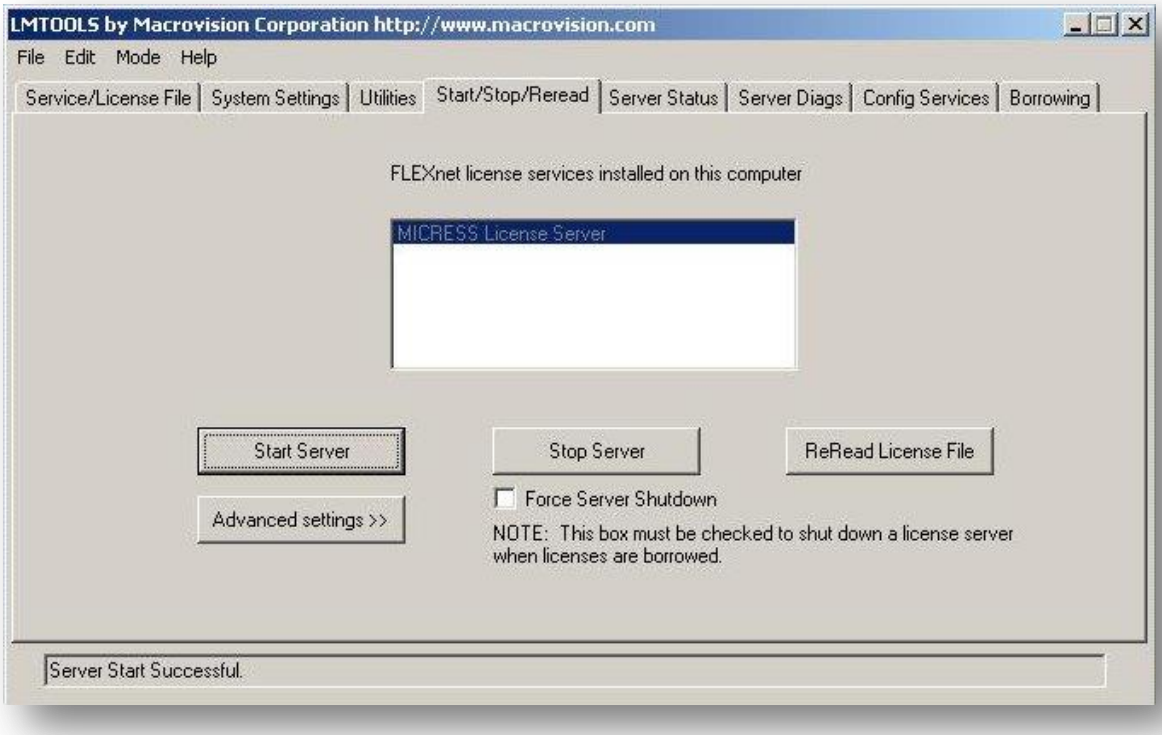


Figure 3.4 The Installation of the license server has been successful.

The other lmtools task bar functionalities are helpful when installing and operating the license server and in the following, a short description of their use is given. For a more detailed explanation of these functionalities, please refer to the FLEXNet licensing end user guide.

- **Service / License File**

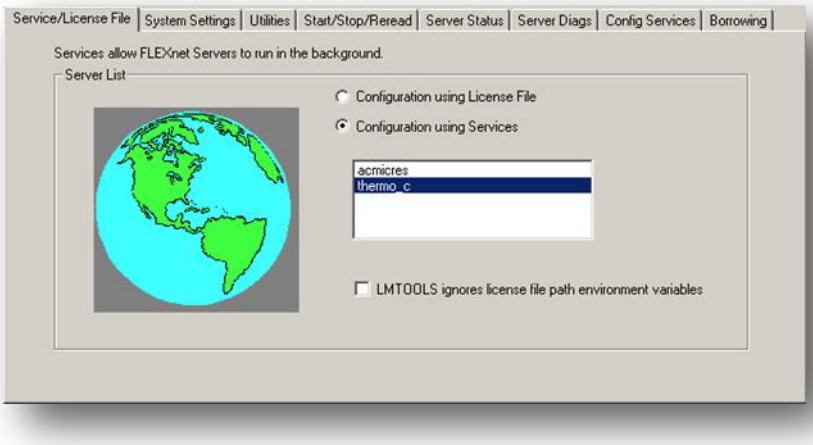


Figure 3.5 The 'Service/License File' button of the lmtools menu

'Configuration using License File' is meant for node locked installations only. MICRESS in general is installed in a network and a 'Configuration using Services' thus is to be used.

- **System Settings displays HOST-ID** and a number of other settings of the computer settings, which can't be changed. By clicking on the 'Save Host-ID into a file' button, a new document (by default in the in the FLEXlm directory) will be created. It contains the Host-ID information - which then is available e.g. for issuing the license file.

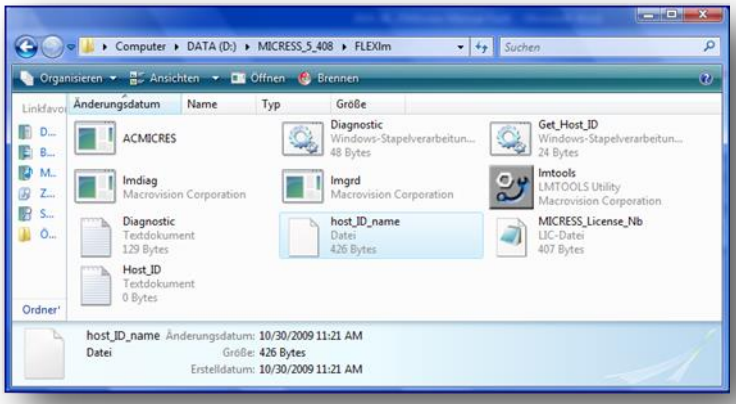


Figure 3.6 The created text file for the HOST-ID

- **Utilities:** the utilities menu, see Figure 3.7, provides a valuable tool for both the license server and also for hooking the clients to the license server.

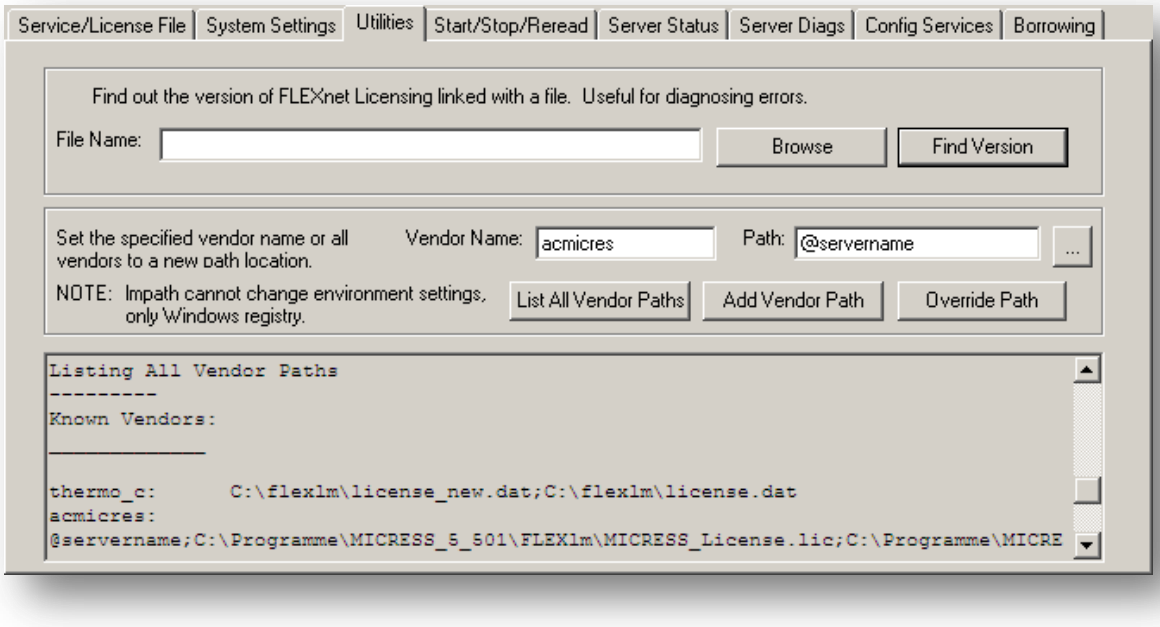


Figure 3.7 **The vendor path operations 'Utilities'**

First 'list all vendor paths' to see if the vendor 'acmicres' is already known to the computer. In case of 'yes' and the listed vendor path being correct, MICRESS should perform normally on this computer. In case the vendor path is not specified correctly, you may add a vendor path by entering the vendor name 'acmicres' and by specifying the path to the license server '@servername' and the clicking on 'Add Vendor Path'. In case of numerous paths being indicated, it is recommended using 'Override Path' as old paths may point to elder licenses not specifying all the features of a new license, which may lead to problems for the newer features. This is also the way to create the link between the clients and the license server.

- **Start/Stop/Reread** activates or deactivates the license manager on the license server. It is possible to re-read the license file.
- **Server status** counts the number of licensing activities and shows if the vendor demon is running. The server name in this example is 'sf1', Figure 3.8, reflects the current server status for the individual demon. Similar diagnostics can be performed for the different features (see e.g. in your license file) like MICRESS, MICRESS_Edu (educational version), MICRESS_TQ (TQ-coupled versions) and MICRESS_Stress in case the elastic module is included.

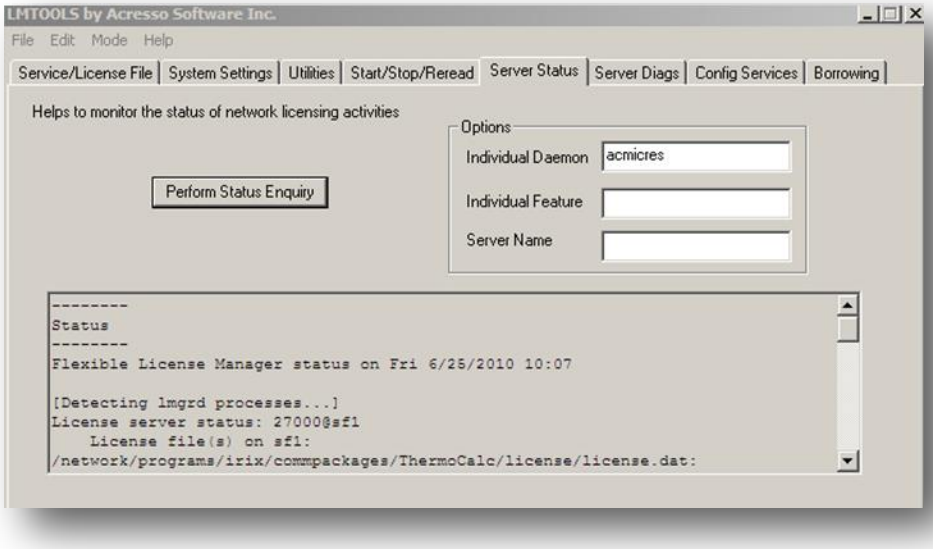


Figure 3.8 **Checking the server status for the vendor demon 'acmicres'**

- **Server Diags** (= Diagnostics) allows to check whether a certain feature is licensed or the server works. Typical features of MICRESS are “MICRESS”, “MICRESS_EDU” (educational version), “MICRESS_TQ” in combination with TC-TQ (for TQ-coupled versions) and “MICRESS_Stress” in case the elastic module is included. The different paths to various license files (see also ‘utilities’ menu in Figure 3.7) are scanned for valid licenses for this particular feature. Availability of a valid license for the feature may thus be checked. All input is case sensitive. A typical output is shown in **Figure 3.9Error! Reference source not found.**.

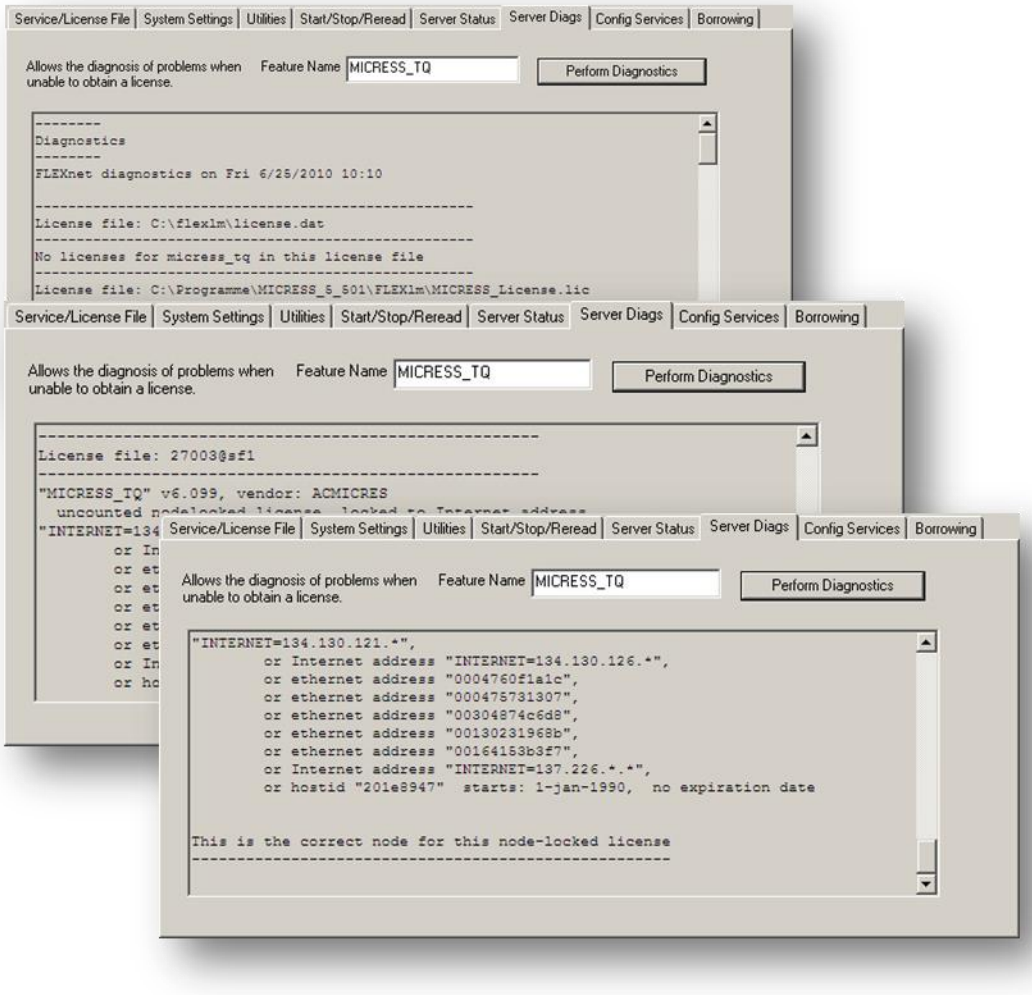


Figure 3.9 Perform diagnostics to find the correct server/license for a specific feature

- **Config Services** (= Configuration Services) asks for inserting the paths to the listed files. The Service name stands for the vendor demon. The function 'View log' is quite important for administrators managing the server because it lists all enquiries to the server, see Figure 3.10.
  This log file lists all the activities of a vendor demon (here 'acmicres') like giving a lease for a certain feature to a client or user, or reacquiring the respective feature. Leasing a feature to a client can be identified by the term 'OUT' and the return of the lease to the vendor demon is indicated by 'IN' always followed by the name of the user at the respective client. This information is collected over a long period of time, thus just a generic extract is presented here

16:15:48 (lmgrd) please Note:

This log is intended for debug purposes only. In order to capture accurate license usage data into an organized repository, please enable report logging. Use Macrovision's software license administration solution, FLEXnet Manager, to readily gain visibility into license usage data and to create insightful reports on critical information like license availability and usage. FLEXnet Manager can be fully automated to run these reports on

schedule and can be used to track license servers and usage across a heterogeneous network of servers including Windows NT, Linux and UNIX. Contact Macrovision at www.macrovision.com for more details on how to obtain an evaluation copy of FLEXnet Manager for your enterprise.

FLEXnet Licensing (v10.8.0.1 build 19446) started on SF1 (linux) (5/7/2010)

Copyright (c) 1988-2005 Macrovision Europe Ltd. and/or Macrovision Corporation. All Rights Reserved.US Patents 5,390,297 and 5,671,412. World Wide Web: www.macrovision.com

License file(s): network/programs/linux/MICRESS/license/MICRESS_License.lic

lmgrd tcp-port 27003

16:15:48 (lmgrd) Starting vendor daemons ...

16:15:48 (lmgrd) Using vendor daemon port 27010 specified in license file

16:15:48 (lmgrd) Started ACMICRES (internet tcp_port 27010 pid 30107)

16:15:48 (ACMICRES) FLEXnet Licensing version v11.7.0.0 build 73797 i86_lsb

16:15:48 (ACMICRES) lmgrd version 10.8, ACMICRES version 11.7

16:15:48 (ACMICRES) Server started on SF1 for: MICRESS_TQ 16:15:48 (ACMICRES) MICRESS_Stress, MICRESS_Flow

16:15:48 (ACMICRES) EXTERNAL FILTERS are OFF

16:15:48 (lmgrd) ACMICRES using TCP-port 27010

16:32:35 (ACMICRES) TCP_NODELAY NOT enabled

17:25:11 (ACMICRES) OUT: "MICRESS_Stress" user@client.1

17:25:11 (ACMICRES) OUT: "MICRESS_TQ" user@client.2

17:25:21 (ACMICRES) IN: "MICRESS_Stress" user@client.1

17:25:21 (ACMICRES) IN: "MICRESS_TQ" user@client.2

.....

Figure 3.10 **Example of a section of a log file**

- **Borrowing** refers to the maximum duration of a lease and some other options to manage the distribution of licenses in a network via a defined lease time. For detailed information on this option please refer to the FLEXNet licensing end user guide.

At the end of this section on "Setting up the license Server", your license server manager should be operational and it should be possible to run MICRESS directly on the license server at least without TQ coupling (using e.g. the Grain_Growth.dri, see chapter 6). Of course, the IP address of the license server has to be in the licensed IP range according to the MICRESS license file (see section 2.2). This is the first check you should make in terms of potential trouble shooting. Running MICRESS successfully on the license server indicates the license file and the lmgrd configurations to be correct.

The next step is to install the Safenet license system for the TQ part (see section 3.2) and eventually to install MICRESS on the individual clients as described in section 4.

3.1.2 Starting the FLEXlm license service under Linux

After the installation of MICRESS, you will find the FLEXlm license manager demon 'lmgrd' in the 'FLEXlm' subdirectory. Usually, it is sufficient to start it on your designated license server machine with the following options:

```
lmgrd -2 –p –c  <license file> -l <log file>
```

Where the 'license file' is the file which you receive from the vendor and the 'log file' is a new file to store the demons log messages. The license manager itself will start a second process for the vendor demon 'ACMICRES'. For communication between the server and the clients a TCP/IP connection will be enabled using ports in the range from 27000 to 27010 by default or as defined in the license files. Please make sure that the firewall will not block these ports. For security reasons, the use of the default port 27000 is not recommended. Usually, all vendor licenses are set up to use port 27009. The port number may be edited by the end-user in the server line in the license file:

```
SERVER servername host-id [port-number]
```

A valid port-number is any unused port number between 0 and 64000. On UNIX, choose a port >1024, since those <1024 are privileged port numbers. The port number is optional if lmgrd, the vendor demon, and the application are higher than version 6.

The following steps are recommended by Flexera Software as License Administrator best practices to help protect against potential security vulnerabilities (see also respective file in the FlexLM directory of your MICRESS installation for further information):

- Limit access to administrative users only by running the license server manager in a restrictive mode. The '-2 –p' command-line option on lmgrd is the recommended setting. Refer to the product documentation for limitations related to usage of these command-line options.
- Do not use the default 27000 TCP port.

- Utilize the recommended security settings offered by the Operating System (OS) vendors that resist the buffer/stack overflow attacks. For example, the Data Execution Prevention (DEP) feature on Windows helps in this regard. Most OS updates also include security features that take advantage of both hardware and software based protection mechanisms against malicious code execution.

The FlexLM utility 'lmutil' is a general purpose tool to stop and run diagnostics on the license manager.

- lmutil lmdown – end the license manager demon process. Alternatively, the entire lmgrd process may be finished by "kill <process id>"
- lmutil lmdiag – perform diagnostics

See the 'FLEXNet licensing end user guide' for more information.

3.2 The Safenet Sentinel license server

From MICRESS version 6.0 and later, the TQ interface of Thermo-Calc is licensed via a new license system, the Safenet Sentinel. The basic concept of the Safenet Sentinel license server is quite similar to the FLEXlm system.

The installation of this license management system is part of the usual Thermo-Calc installation. For the MICRESS 6.1 Thermo-Calc coupling, the license feature TC_TQ 5.000 (Thermo-Calc version S) is necessary. This additional license feature is part of the Thermo-Calc license file or will be provided by your MICRESS agent separately. See section 3.2.1 for Windows, resp. section 3.2.2 for Linux, to install the license manager if there is no Thermo-Calc installation available.

3.2.1 Starting the Safenet Sentinel license service under Windows

This procedure should only be performed if there is no Thermo-Calc installation available.

The installation files for the network license manager are found in the folder Safenet in your MICRESS installation directory (see section 5.4.2). Copy these to the computer where the license manager will be installed and double-click the file “Sentinel RMS License Manager 8.3.0.msi”. Follow the instructions during the installation (see Figure 3.11 and choose the default installation folder. The license manager will be installed to “C:\Program Files\Common Files\SafeNet Sentinel\Sentinel RMS License Manager\WinNT”, or similar.

Sentinel RMS License Manager 8.1.1 - InstallShield Wizard
Welcome to the InstallShield Wizard for Sentinel RMS License Manager 8.1.1
The InstallShield(R) Wizard will install Sentinel RMS License Manager 8.1.1 on your computer. To continue, click Next.
WARNING: This program is protected by copyright law and international treaties.
Sentinel RMS
Development Kit
< Back
Next >
Cancel

Figure 3.11 **The Thermo-Calc Software makes use of another license manager which is called 'Safenet Sentinel'. This change applies to MICRESS version 6.0 and later.**

Open the folder “Licenses\Floating” on the CD and copy the license file “LSERVRC” to the folder where the license manager was installed (…\WinNT). Try to start MICRESS with a TQ coupled example e.g. Delta-Gamma on the server. If it doesn’t work, restart the computer.

If the license server is running on the same subnet as the client, it will normally be detected automatically. However, if the server is on a different subnet, there is a need to explicitly define on the client where the server resides. This is done by accessing the "Advanced" tab of the "System Properties" in the "Control panel". There by

clicking the "Environment Variables" button, a variable named "LSHOST" may be entered containing the name/address of the license server.

3.2.2 Starting the Safenet Sentinel license service under Linux

The Safenet license service must be run with root privileges. Use the script file 'restart_lserv' to start the license service demon on your designated server. Before running the script, edit the script file in the following way. BINDIR should be the correct path to the license manager (lserv) and LICENSE_FILE the path to lservrc (the license file). LOGDIR is the path to where the log files are stored.

The MICRESS/bin/safenet directory (in a standard linux installation) contains the following files:

- **echoid** program file used by gethostid
- **gethostid** script that writes the computers IP address which will be used by the license management in a text file. This IP is necessary for providing a license file.
- **lserv** program file that runs a license service
- **lsmon** program file for monitoring the license service
- **lsrvdown** program file for stopping the license service
- **lswhere** program file for locating license servers
- **restart_lserv** template for a script for restarting the license service

The license server setup consists of two parts: *lserv* which is the license server manager (or demon), and *lservrc*, which is the license file. The correct license file for your system is either included on the distribution CD in the licenses folder, or has been sent to you by e-mail. If you do not have a license file, contact Access or your local agent. It is recommended to copy the server license file to the "MICRESS/bin/Safenet" directory.

4 Installing MICRESS on the clients

This chapter will detail the procedure for installing MICRESS under both Windows and Linux on your client computer.

4.1 Introductory remarks

Installing MICRESS should be done with its installer. In case of using Windows, it is necessary to have 'power user' privileges in view of necessary rights to modify the registry to set file associations during installation. Make sure your client works within one of the domains specified in the license file and can communicate with the license server.

4.2 Installing MICRESS® under Windows

In order to install MICRESS on your computer, please insert CD into CD-ROM Drive. The installation will start automatically:

Figure 4.1 The window pops up asking to carry the installation into execution.

If 'autoplay' for media is activated on your system, MICRESS installation should start automatically; else it is possible to run the INSTALL_MICRESS.exe manually.

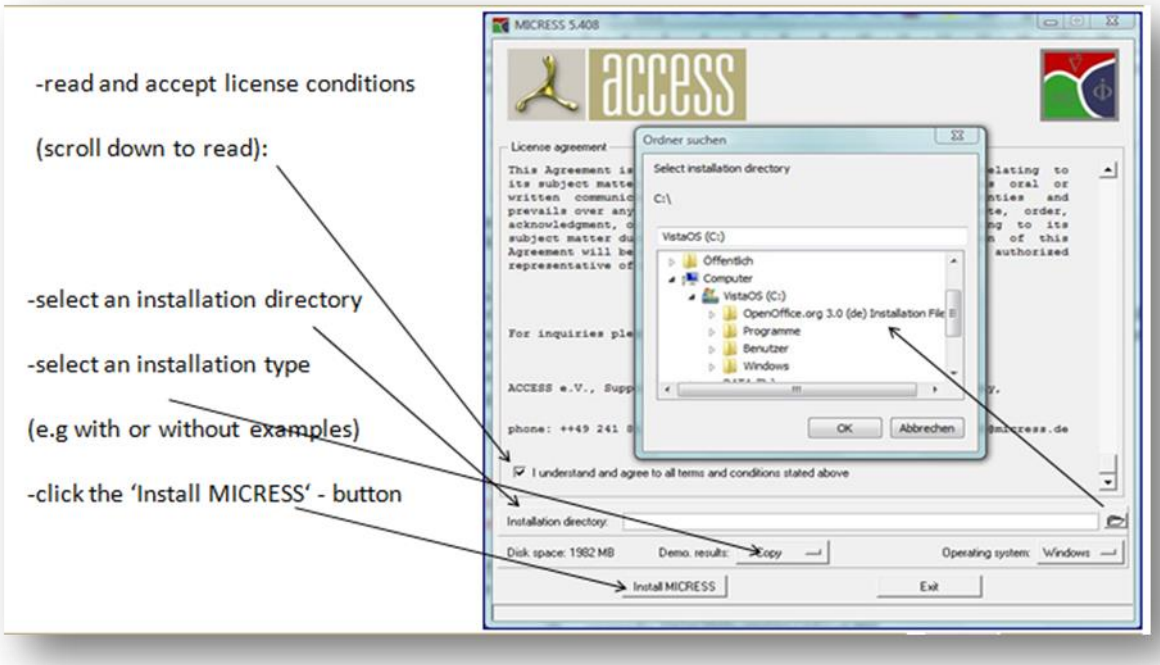


Figure 4.2 **Entering the data in order to perform the installation**

During the installation process, please make the following decisions:

- **'Installation directory'** defines the directory where MICRESS will be installed on your computer. Your favoured directory may be selected by clicking on the file symbol.
- **Select an installation type**. The demo results can be copied (uncompressed), skipped or copied (compressed) to the installation directory. However, the demo input files will be always installed.
- **Linux or Windows platforms** (32 or 64 bit) may be selected as the operating system.
- Please read the **license conditions** carefully by scrolling down and then tick the respective box to accept the license conditions.

MICRESS® will then be installed on your computer by clicking the 'Install MICRESS' button.

The end of the installation is indicated by a respective window, see Figure 4.3. A reboot of the system is necessary to establish the registered connections between MICRESS and the result file type, i.e. '.mcr'

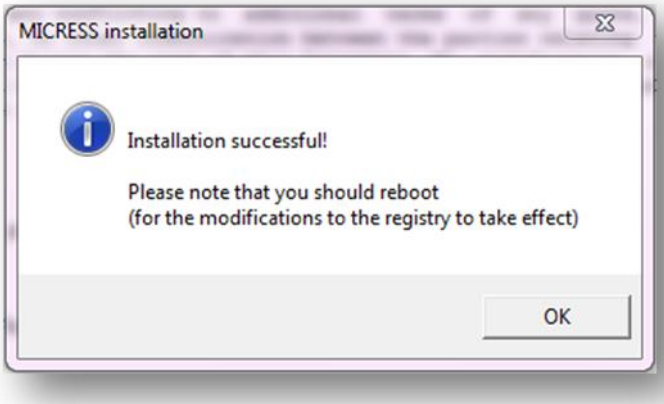

MICRESS installation
Installation successful!
Please note that you should reboot
(for the modifications to the registry to take effect)
OK

Figure 4.3 **MICRESS® has been successfully installed on your computer if this window appears.**

4.3 Installing MICRESS® under Linux

The Linux installation is similar to the installation under Windows.

Insert the CD into CD-ROM drive. The installation will start automatically when clicking 'Run'. If the installation window does not pop up automatically, start the 'Install_MICRESS_Linux' program in the disk root directory manually.

MICRESS 5.501
This medium contains software intended to be automatically started. Would you like to run it?
The software will run directly from the medium "MICRESS 5.501 ". You should never run software that you don't trust.
If in doubt, press Cancel.
Cancel
Run

Figure 4.4 **The window pops up asking you to run the installation.**

Make your installation choices analog to description of the Windows installation in section 3.2.1. In Linux/Unix, MICRESS can be installed with normal user privileges. Of course, write permissions to the installation directory are necessary. Also a reboot of the system is not necessary.

4.4 Hooking up the client to the License server or standalone licenses

Hooking the MICRESS client to the license server in general should proceed automatically when starting MICRESS the first time on the client. Start MICRESS by 'drag and drop' of a MICRESS® driving file (e.g. the Delta_Gamma_dri.txt from the examples) onto the MICRESS® executable. A command prompt console, as shown in Figure 4.5, should show up asking for the specification of a license. There are two options: a) either enter the name of the license server (here 'servername') as '@servername' followed by return or b) (for node-locked installations only!) pressing 'return' twice and select the license file, as shown in Figure 4.6.

This procedure is only necessary for the first start up of MICRESS® or if the location of the license file is altered. The entered locations will be stored in the windows registry for future use (power user privileges necessary). For MICRESS TQ-installations (either drawing on Safenet or FLEXlm license services) a similar question for a further license file will appear the first time a TQ-relevant routine is called by MICRESS®. Proceed as above and re-enter the servers name also for the second license.

Alternatively, it is possible to set following user profile environment variables to provide the license location information for the client:

- ACMICRES_LICENSE_FILE=@*servername* – for the MICRESS license
- LSHOST=*servername* – in case of using a Thermo-Calc library version S (default in MICRESS_TQ version 6.0).

This is possible without power user privileges and no changes of the registry are necessary. The same variable names are also used for licensing with a Linux operating system.

In a standalone installation without any license management processes, the locations of the license files have to be given directly, e.g.

- ACMICRES_LICENSE_FILE="D:\MICRESS_Bin\FlexLM\MICRESS_license.lic"
- LSHOST=no-net
- LSERVRC="D:\MICRESS_Bin\Safenet\lservrc"

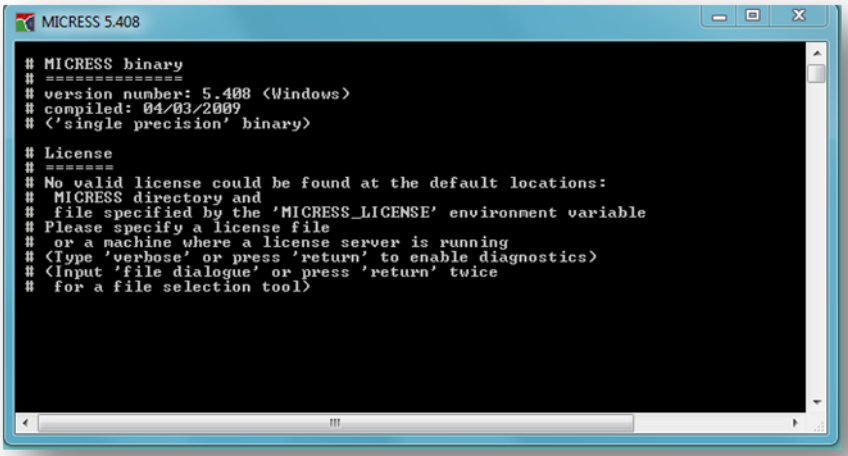

MICRESS 5.408
MICRESS binary
==============
version number: 5.408 (Windows)
compiled: 04/03/2009
('single precision' binary)
License
=======
No valid license could be found at the default locations:
MICRESS directory and
file specified by the 'MICRESS_LICENSE' environment variable
Please specify a license file
or a machine where a license server is running
(Type 'verbose' or press 'return' to enable diagnostics)
(Input 'file dialogue' or press 'return' twice
for a file selection tool)

Figure 4.5 **The software cannot find the appropriate license file. This is the default situation during the first ramp-up. Please specify the license server (see text).**

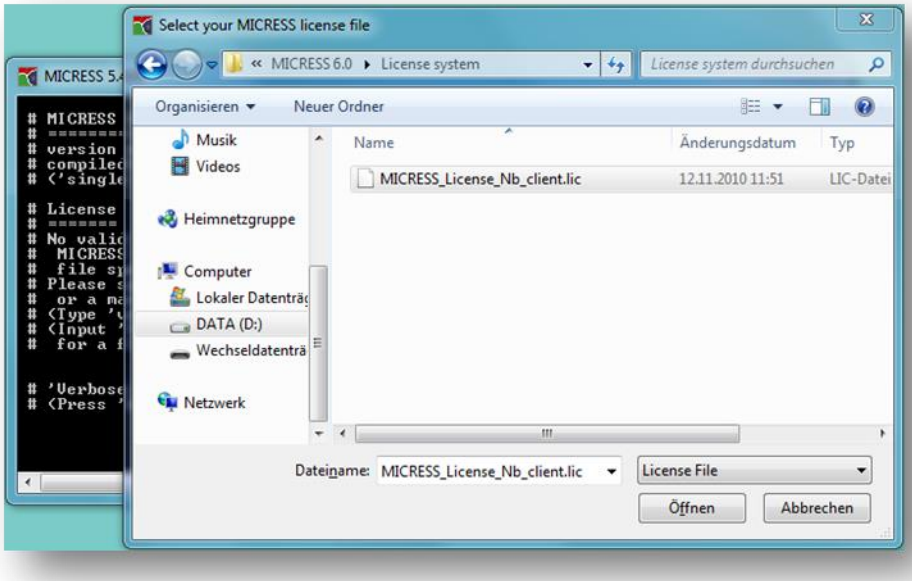


Figure 4.6 Specifying the location of the license file for a node locked installation

4.5 License management diagnostics

In case the automatic hooking described in section 4.4 or the specification of the environment variables should not allow to connect with the license server for whatever reason, following procedure is recommended (see section 3.1.1):

Run the lmtools.exe (see FlexLM directory) on the client. Select 'Utilities" and enter 'acmicres' as a vendor name and '@servername' (where 'servername' is the name of your license server) in the respective boxes. Then click 'Add Vendor Path'.

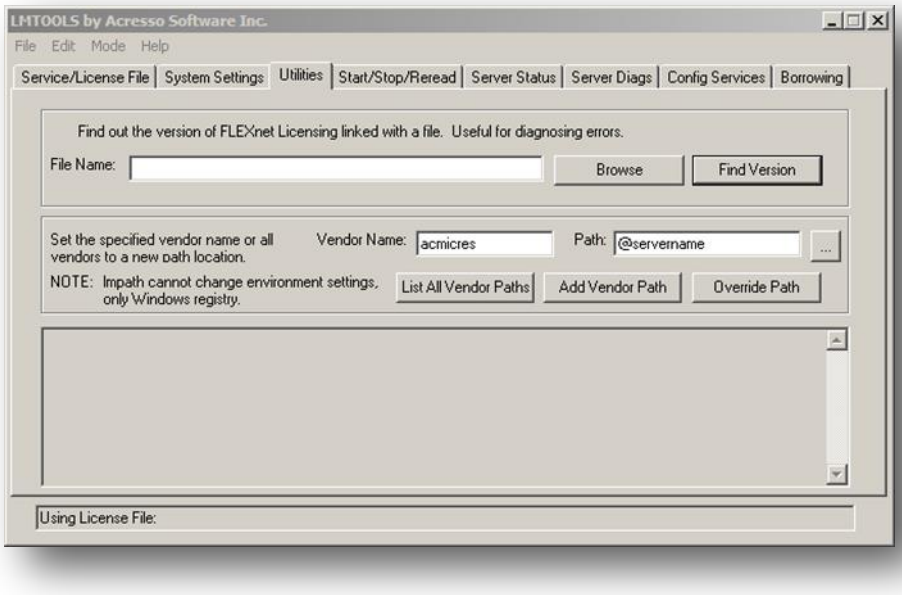


Figure 4.7 **Checking the FlexLM license system with lmtools**

Eventually check 'list all vendor paths' and make sure that a path to your license server is set. As a final verification, you may check the 'server status' on the client by entering '@servername' and perform a status enquiry. If words like 'Vendor daemon status (on servername): ACMICRES: UP v11.10' and 'Vendor daemon status (on servername): thermo_c: UP v9.2' appear in the diagnostics report, the client is successfully hooked to the server

In case a connection to the license server can still not be established, the problem is most probably related to the firewall settings on the server. FLEXlm by default needs the following ports to be open: 2080 and 27000 through 270010. However, there is a security recommendation to specify another port (see section 3.1.1). Please configure your firewall accordingly to have the specified port open and retry the server diagnostics on the client.

5 The MICRESS directories

5.1 Introductory Remarks

This chapter highlights the structure of the program and the functional use of the different menu items. After installation of MICRESS®, which is located in the directory you specified during the installation procedure, the MICRESS® subdirectories should be present, Figure 5.1. In the following sections these four MICRESS® subdirectories will be shortly addressed to facilitate orientation/navigation and to highlight their purpose.

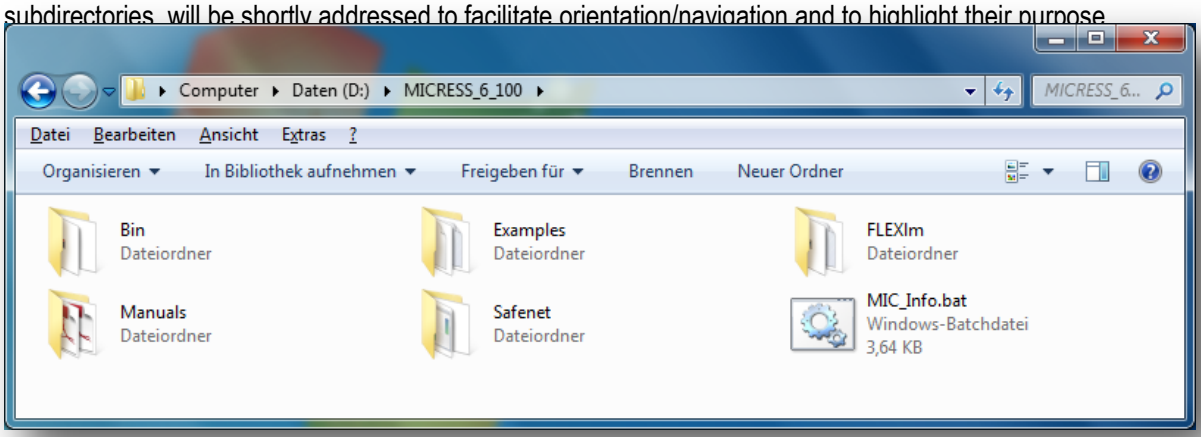


Figure 5.1 In the installation directory, you should be able to identify these five subdirectories.

The Bin directory contains the MICRESS® executables, the Examples directory comprises MICRESS® examples, the FLEXlm and Safenet directories include MICRESS® licensing tools and license files, the Manuals directory provides the different MICRESS® manuals. These components are explained in detail in the following.

5.2 The MICRESS® binaries (BIN) directory

Here the MICRESS® binaries and their related files are located:

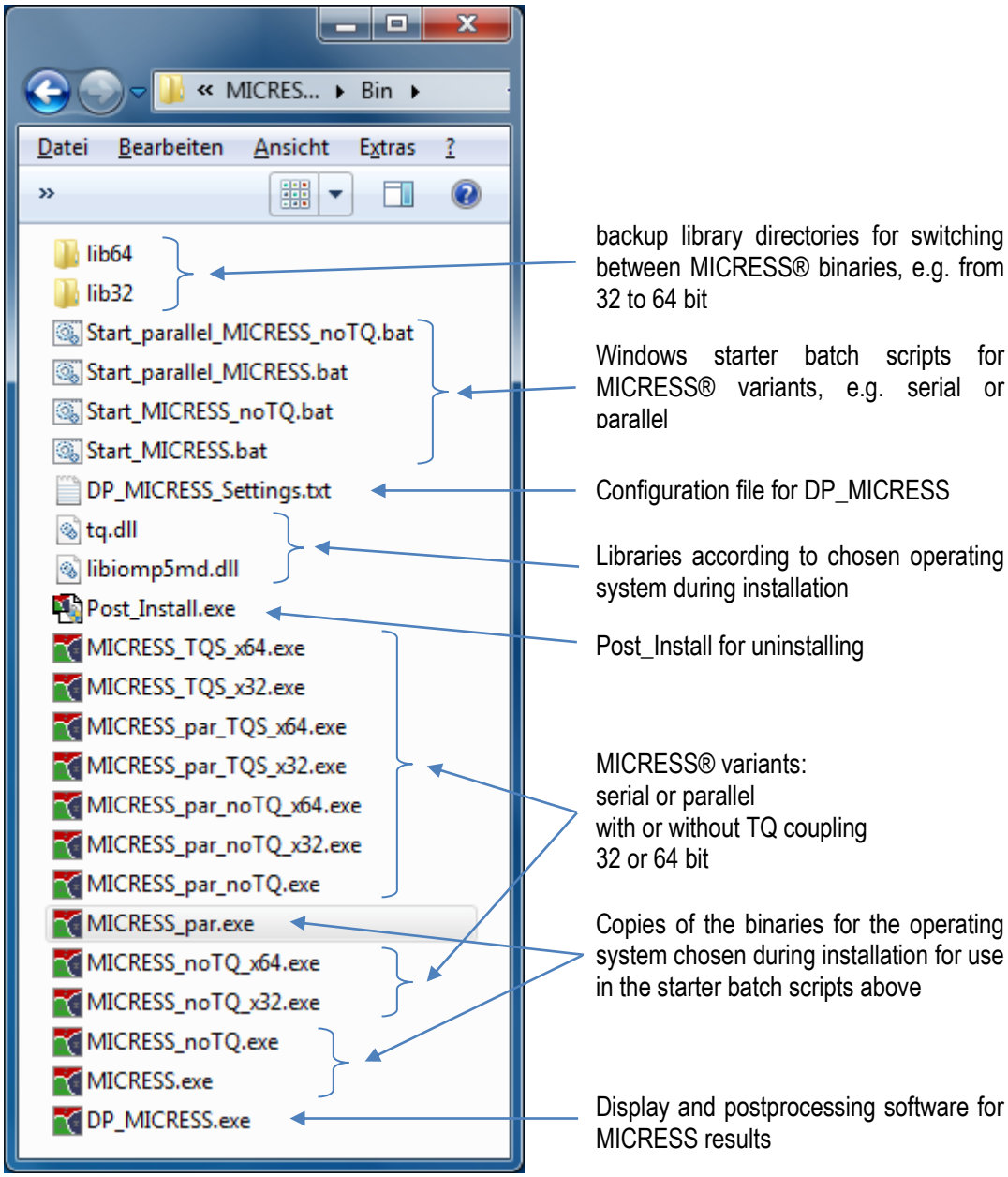


Figure 5.2 The Bin directory contains starter scripts, executable files, and some program libraries

Shortcuts to the batch files “Start_MICRESS”, “Start_MICRESS_noTQ” and the binary “DP_MICRESS” will be created on all users desktop during installation. TQ coupled versions can also run simulations not using the TQ interface, but not the other way round.

5.3 The MICRESS® examples directory

The MICRESS examples directory comprises subdirectories for the GES5 files (thermodynamic data) needed to run the TQ coupled examples and subdirectories containing the results of the different examples, Figure 5.3, a number of special text files for specific examples, Figure 5.4, and the driving files needed to run the examples, Figure 5.5.

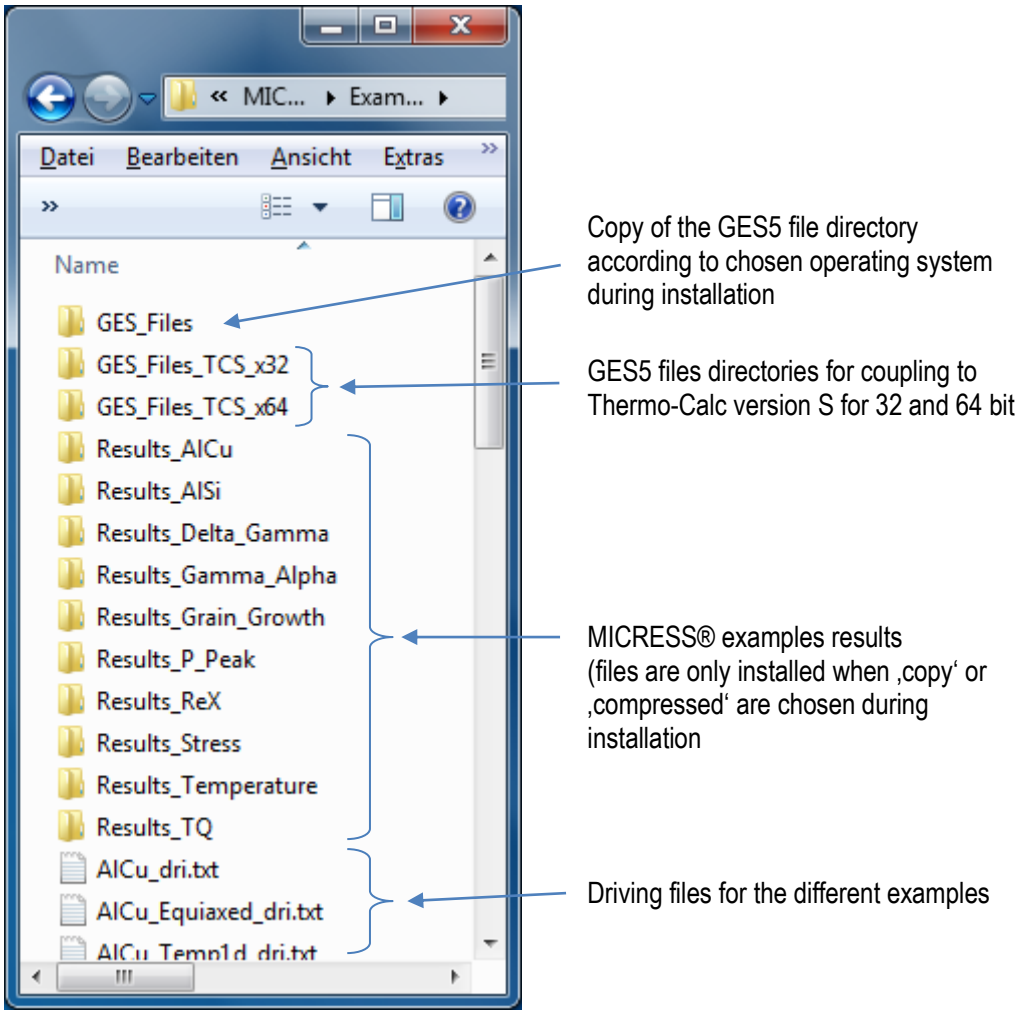


Figure 5.3 Complete results of the examples

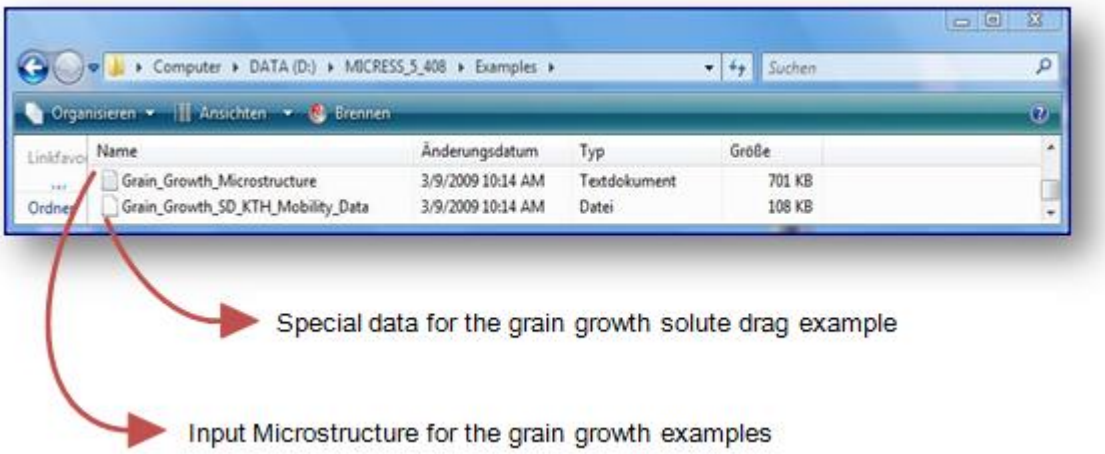


Figure 5.4 Some examples need additional input files, e.g. grain growth

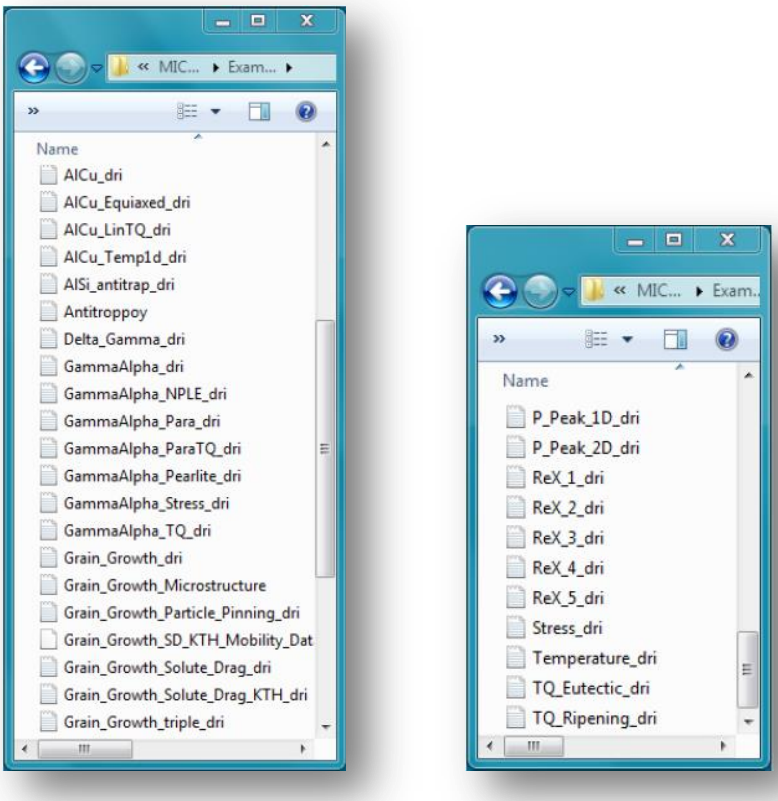


Figure 5.5 The MICRESS examples driving and input files

The examples directory contains different driving – and/or result files allowing to run and to visualize several available simulations. To check the installation, run one of these examples and subsequently have a look at the result files by using DP_MICRESS. A detailed instruction of handling this procedure is explained in chapter 6 'Checking the installation'.

MICRESS examples directory → Results

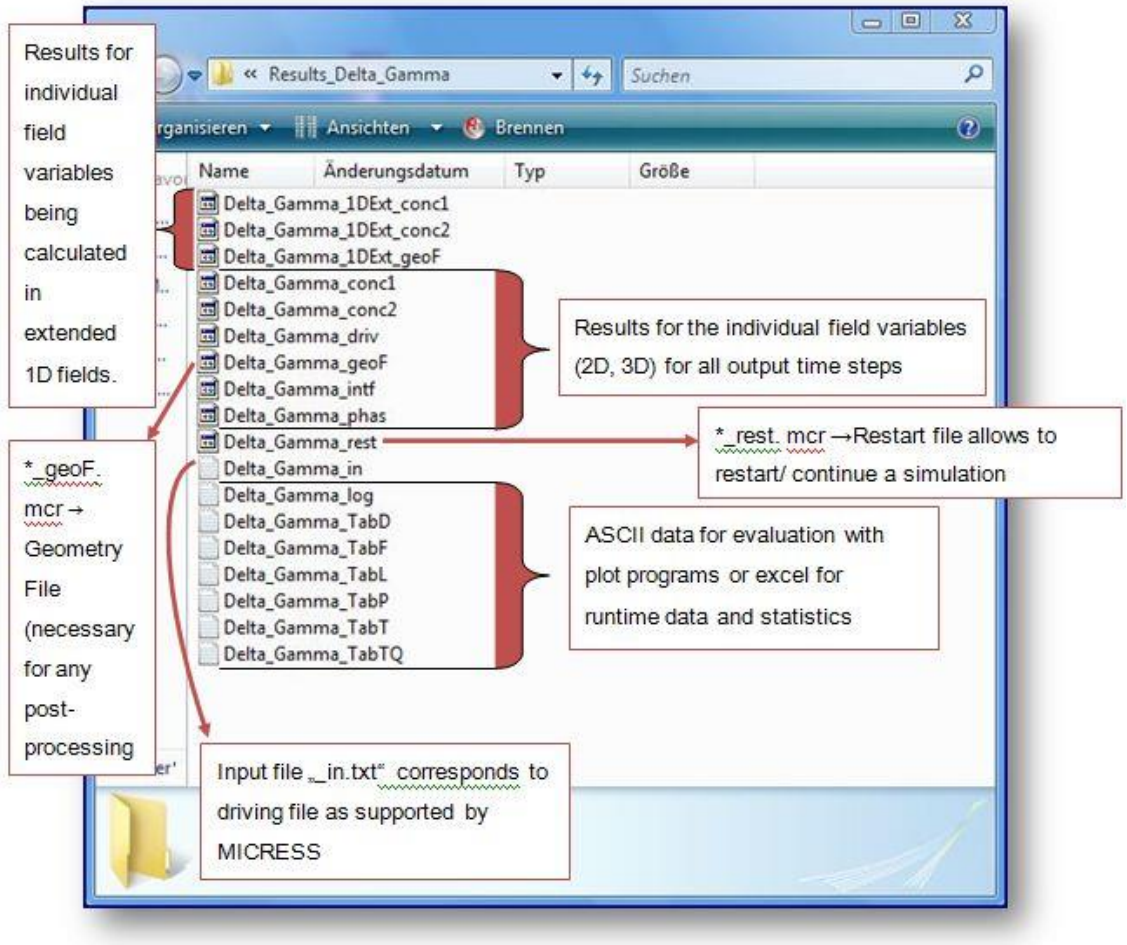


Figure 5.6 The Delta_Gamma results also explain the generic meaning of the examples result files being found in the result directories of other examples

5.4 The License systems (FLEXlm and Safenet)

The License system contains several files related to the license and the license server. The directories FLEXlm and Safenet refer to the different license services used by MICRESS and by the TQ interface. MICRESS uses the FLEXlm license system, while the TQ part of the license depends on the actual version, see table. There are also some diagnostic tools available which simplify searching for errors or assist in trouble shooting.

	License	Windows	Linux
MICRESS® without TQ (all versions)	MICRESS license	FLEXlm	FLEXlm
MICRESS® with TQ (up to version 5.5)	MICRESS license TQ license	FLEXlm FLEXlm	FLEXlm FLEXlm
MICRESS® with TQ (from version 6.0)	MICRESS license TQ license	FLEXlm Safenet	FLEXlm Safenet

5.4.1 The FLEXlm license

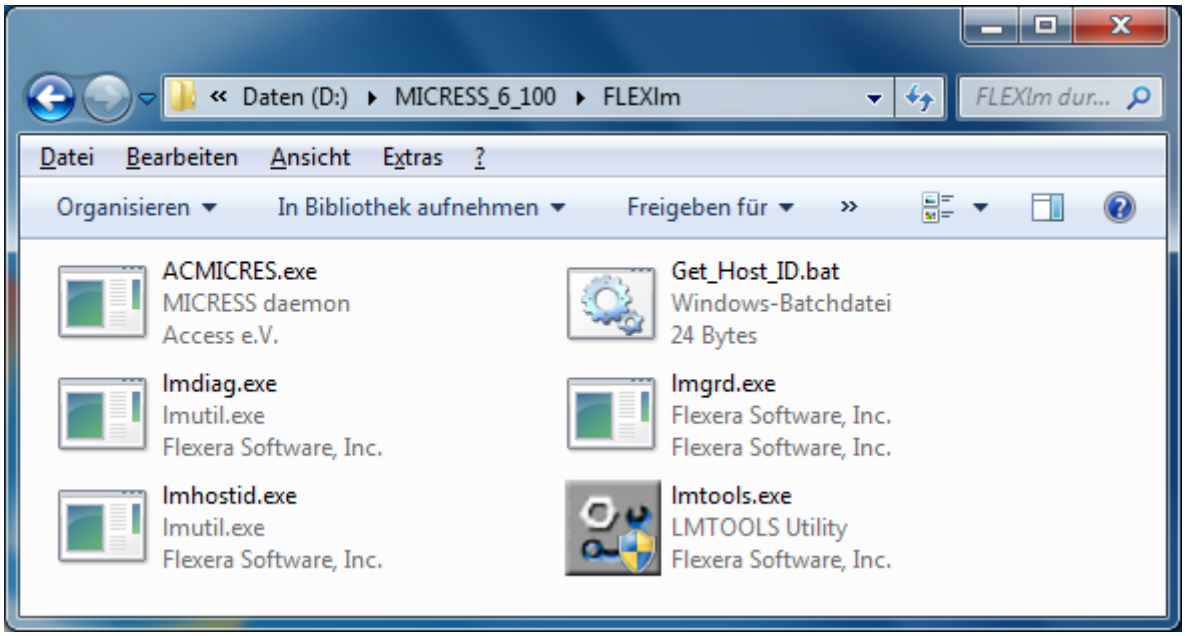


Figure 5.7 The FLEXlm directory

In detail these files are:

- **ACMICRES** is the vendor daemon for the license file. The vendor daemon plus the license server manager (lmgrd) result in the complete license server system.
- **lmgrd** is the license server manager. The license server manager and the vendor demon add up to the whole license server system that provides the license files.
- **lmtools** is a graphical user interface to the license server manager. It performs functions like starting, stopping and configuring FLEXnet license server systems or getting information like the Host-ID.
- **Get_Host_ID** is the tool needed to retrieve the Host-ID.
- **Host_ID_name**. In this '.txt' document the Host-ID is saved by the 'Get_Host_ID'.
- **lmdiag**, the diagnostic tool, lists each license lease and serves for debug purposes. It may display problems or identify successful license checks.

5.4.2 The Safenet Sentinel license

The Safenet Sentinel license and its tools are quite similar to the FLEXlm license. For more please take a look at the website www.SafeNet-Inc.com/Sentinel.

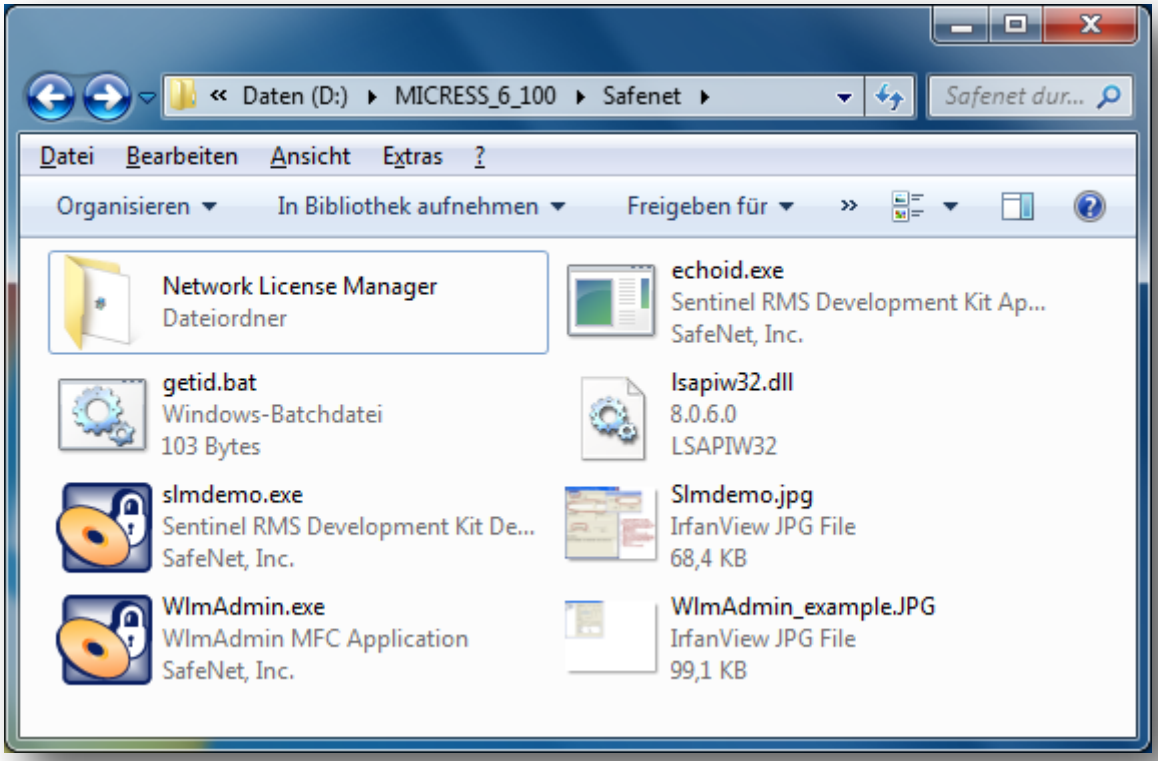


Figure 5.8 The 'Safenet' directory (Windows)

In detail these files/directory are:

- **Network License Manager** contains the installer and data cab for the license manager. This installer should only be used if there is no Thermo-Calc installation (see section 3.2).
- **echoid** program file used by getid.bat
- **getid.bat** script that writes the computers IP address and network setting (ipconfig) which will be used by the license management in a text file. This information is necessary for providing a license file.
- **WlmAdmin** graphical administration and diagnostic tool for the license system
- **slmdemo** a demo tool for checking out designated license features

5.5 Diagnostic Tools

The diagnostic tool MIC_Info, a batch script for Windows, a shell script for linux, is found in the root installation directory. The MIC_Info tool is a diagnostics tool which writes a “MIC_Info.txt” file when running it.

The following information will be collected:

- Registry setting (Windows) for Thermo-Calc, FlexLM and Safenet Sentinel license managers
- Host ID
- IP configuration
- FlexLM diagnostic information (tool ‘lmdiag’)
- The license files (*.lic) in the MICRESS FlexLM directory
- Directory list of the MICRESS binary, example, and FlexLM directory

Just send the file to your MICRESS contact and we can find solutions. The file MIC_info.txt will be saved in the directory where you start the script.

5.6 The MICRESS® Manuals directory

The FLEXNet licensing end user guide and the Safenet user manual comprise any detailed information relating to the license systems.

The five MICRESS® manuals refer to the different applications of the software: MICRESS phenomenology, MICRESS Installation, Running MICRESS®, MICRESS Post-processing and MICRESS Examples.

For questions not being answered in one of these manuals, please do not hesitate to contact Access or one of its agents. Another option of finding answers is to consult the MICRESS users forum under www.micress.de.

6 Checking the installation

6.1 Introduction

The chapter “Checking the installation”contains step by step instructions for running two simple examples. Scope of this exercise is to verify the successful installation of MICRESS on the client. The two examples being described in detail are “Grain Growth”as a typical example for a simulation *without* Thermo-Calc-coupling and “Delta_Gamma” which comprises coupling to thermodynamic data.

The example with Thermo- Calc coupling is also important because it makes use of another license vendor (thermo_c) and even another license server (Safenet Sentinel) from version 6.0.

First step is the visualization of an already existing example being provided with the distribution using DP_MICRESS. This will show how the results should look like after having started an own simulation later. The respective result will be overwritten by your own simulation.

The first result to be visualized is the distribution of the individual grains in the grain-growth example. This example is located in the “MICRESS examples” directory in the subdirectory “Results_Grain_Growth”. There are a number of different result file types for this particular grain growth simulation. Please refer to the MICRESS manuals Volume 2 and Volume 3 for a detailed explanation. For checking the installation it is sufficient to use the following result file: Grain_Growth_korn.mcr (the extension .mcr may not always be displayed).

There are several different options for visualizing this result file e.g:

- the drag-and-drop option
- left- click the result file and hold the button pressed, then drag-and-drop the file onto the DP MICRESS shortcut icon.
- right- click on a result file and select ‘open with…‘ .
- selecting DP MICRESS from the list will then autostart the program.
- double-clicking on the result file

The process of checking the installation consists of two separate steps:

1) First run DP MICRESS with an existing results file. In detail: Using the visualization tool to find out how your example should look like (before running it yourself). Use e.g. the result file “Grain_Growth_ korn.mcr”. The mere visualization of result files does not need any license.
2) Running an existing simulation setting (a license is mandatory) by using a so-called “_dri” file,
   a) Grain_Growth_dri (without TQ- coupling)
   b) Delta_Gamma_dri (comprising TQ- coupling)

6.2 Viewing an existing result file with DP MICRESS

It is possible to check the output by taking a look at a result file. DP_MICRESS is used for this operation. An existing example file can be dragged and dropped on the display tool. Here the example of 'Grain_Growth_korn.mcr' (without TQ-coupling) is used.

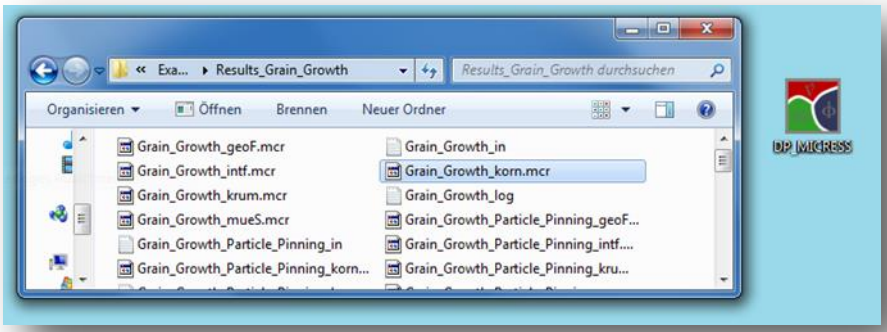


Figure 6.1 Dropping a result file onto DP_MICRESS

The opening window should look like the following:

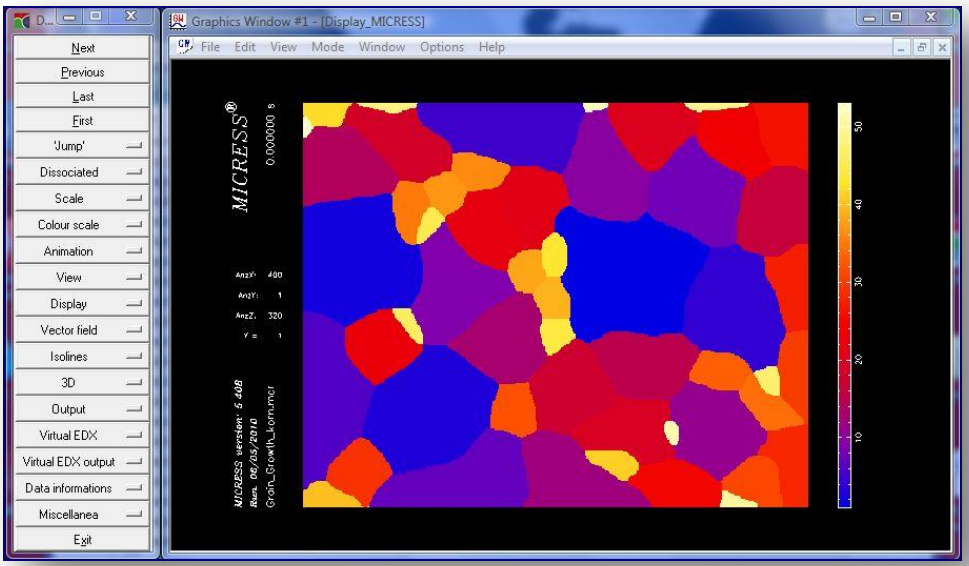


Figure 6.2 The window represents the result for the first time step, i.e. the initial conditions.

Because DP_ MICRESS displays a completed simulation each individual time step may be viewed – even just in the first place. Figure 6.2 shows the last step of this simulation. You can directly switch from the first to the

last time step or step through the time-steps by “next” or “previous”. A detailed description of DP_MICRESS is found in the MICRESS manual Vol. 3 on “MICRESS post processing”

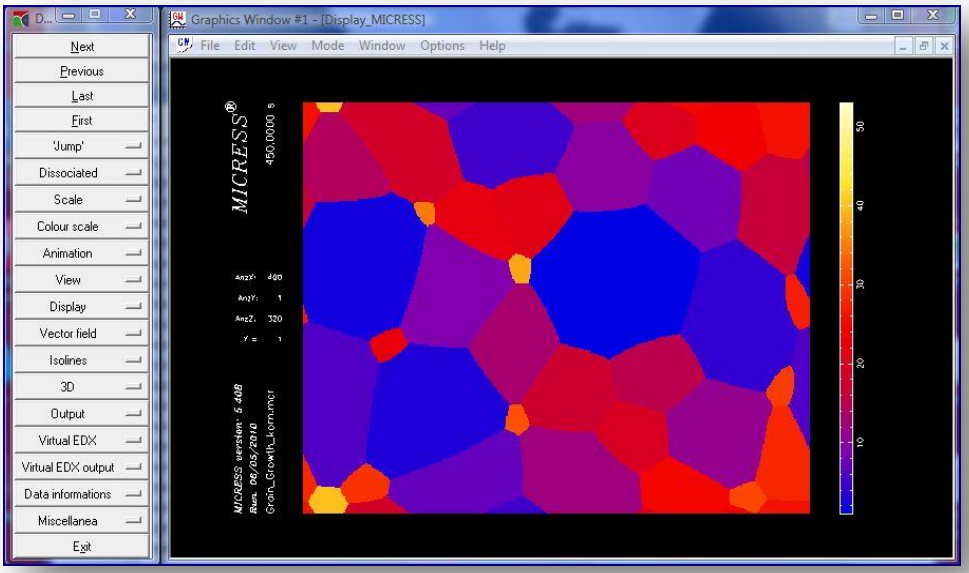


Figure 6.3 The last time step of the Grain_Growth_korn example

6.3 Getting an existing simulation started under Windows

MICRESS® simulations in general are run by a so called driving file. Examples for driving files are found in the examples directory. A MICRESS simulation is started by dragging-and-dropping the file “Grain_Growth_dri” onto the MICRESS® shortcut. After first results are written into the results file (check date/time of file up-date), it is possible to have a direct look at them by using DP_MICRESS even while MICRESS is still continuing the simulation. The example of ‘Grain_Growth_dri’(without TQ-coupling) is presented again.

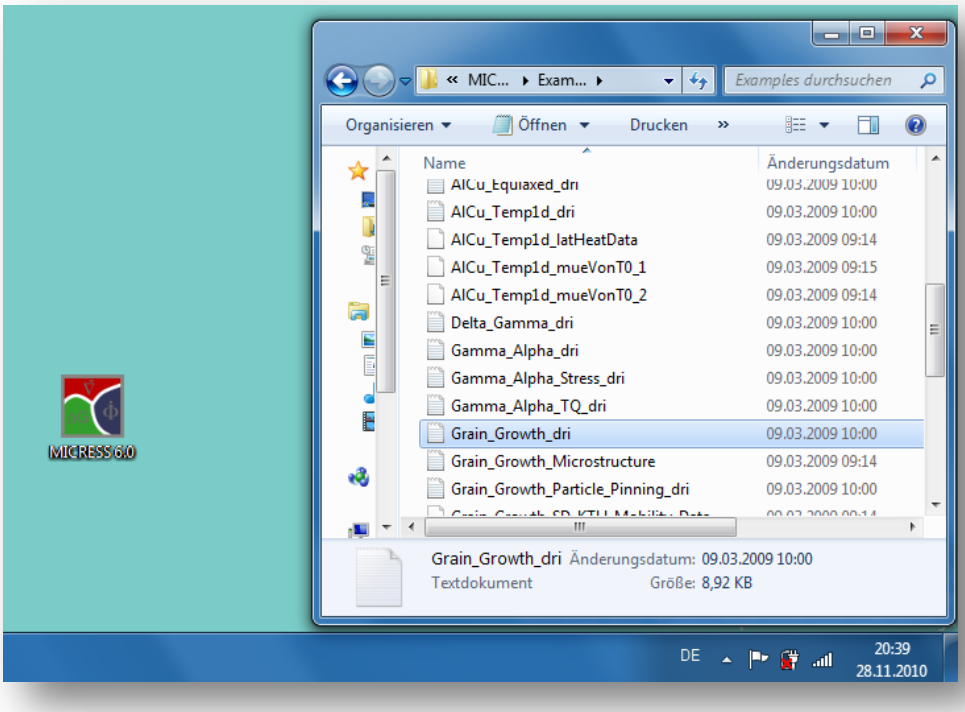


Figure 6.4 Running a simulation with a driving file by 'drag&drop' it on MICRESS®

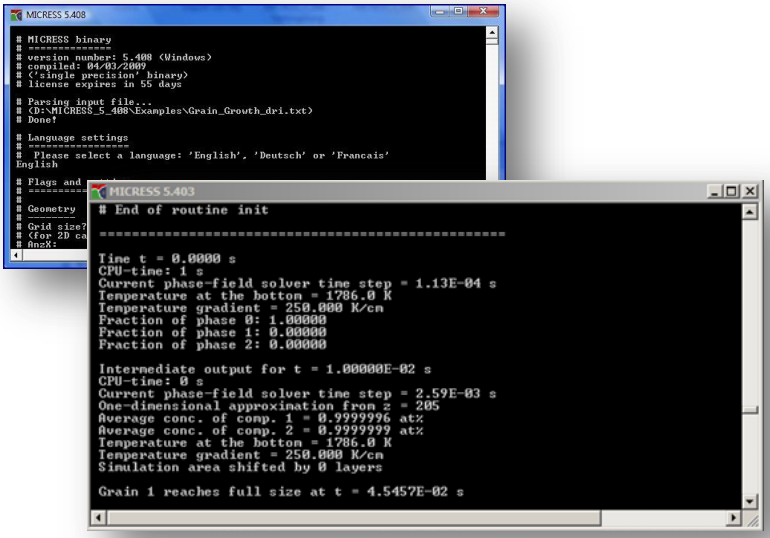

MICRESS 5.408
MICRESS binary
version number: 5.408 (Windows)
compiled: 04/03/2009
('single precision' binary)
license expires in 55 days
Parsing input file...
D:\MICRESS_5_408\Examples\Grain_Growth_dri.txt)
Done!
Language settings
Please select a language: 'English', 'Deutsch' or 'Francais'
English
MICRESS 5.403
End of routine init
Time t = 0.0000 s
CPU-time: 1 s
Current phase-field solver time step = 1.13E-04 s
Temperature at the bottom = 1786.0 K
Temperature gradient = 250.000 K/cm
Fraction of phase 0: 1.00000
Fraction of phase 1: 0.00000
Fraction of phase 2: 0.00000
Intermediate output for t = 1.00000E-02 s
CPU-time: 0 s
Current phase-field solver time step = 2.59E-03 s
One-dimensional approximation from z = 205
Average conc. of comp. 1 = 0.9999996 at%
Average conc. of comp. 2 = 0.9999999 at%
Temperature at the bottom = 1786.0 K
Temperature gradient = 250.000 K/cm
Simulation area shifted by 0 layers
Grain 1 reaches full size at t = 4.5457E-02 s

Figure 6.5 The MICRESS simulation is running and MICRESS has created its first outputs indicating a successful installation

It is helpful to take a look at the clicking time to check whether MICRESS® has started creating output – also during an ongoing simulation. It enables finding the most recent files in the 'Results'directory.

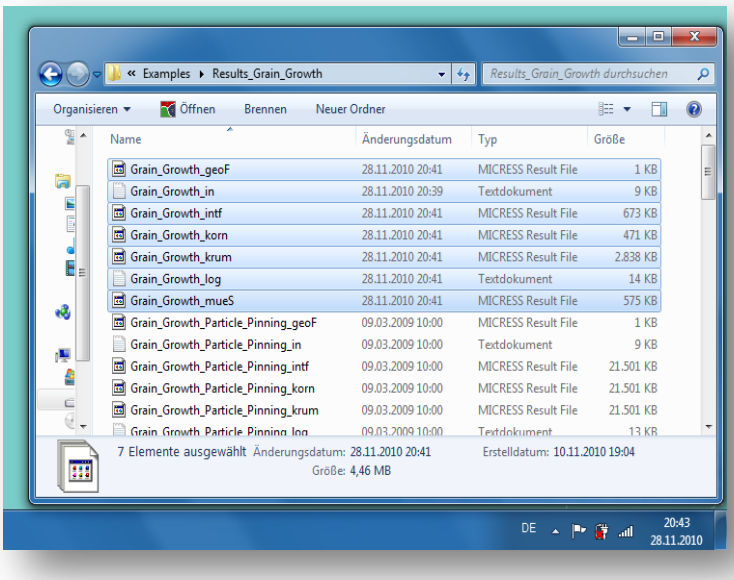

Examples ▸ Results_Grain_Growth
Results_Grain_Growth durchsuchen
Organisieren
Öffnen
Brennen
Neuer Ordner
Name
Änderungsdatum
Typ
Größe
Grain_Growth_geoF 28.11.2010 20:41 MICRESS Result File 1 KB
Grain_Growth_in 28.11.2010 20:39 Textdokument 9 KB
Grain_Growth_intf 28.11.2010 20:41 MICRESS Result File 673 KB
Grain_Growth_korn 28.11.2010 20:41 MICRESS Result File 471 KB
Grain_Growth_krum 28.11.2010 20:41 MICRESS Result File 2.838 KB
Grain_Growth_log 28.11.2010 20:41 Textdokument 14 KB
Grain_Growth_mueS 28.11.2010 20:41 MICRESS Result File 575 KB
Grain_Growth_Particle_Pinning_geoF 09.03.2009 10:00 MICRESS Result File 1 KB
Grain_Growth_Particle_Pinning_in 09.03.2009 10:00 Textdokument 9 KB
Grain_Growth_Particle_Pinning_intf 09.03.2009 10:00 MICRESS Result File 21.501 KB
Grain_Growth_Particle_Pinning_korn 09.03.2009 10:00 MICRESS Result File 21.501 KB
Grain_Growth_Particle_Pinning_krum 09.03.2009 10:00 MICRESS Result File 21.501 KB
7 Elemente ausgewählt Änderungsdatum: 28.11.2010 20:41 Erstelldatum: 10.11.2010 19:04
Größe: 4,46 MB
DE
20:43
28.11.2010

Figure 6.6 New result files are created after starting a MICRESS simulation. Have a look at date and time of the last modification, of the files, which should roughly correspond to the actual time (lower right corner) for an ongoing simulation.

Now it is possible to check the output by taking a look at the result file. DP_MICRESS is used for this operation. You can compare the results to those in section 6.2 or follow the on-going simulation by pressing the “Next” button. Each time the ongoing MICRESS simulation has generated a new output pressing the “Next” button will show the further evolution of the microstructure Figure 6.7 reveals the last time step of the example simulation.

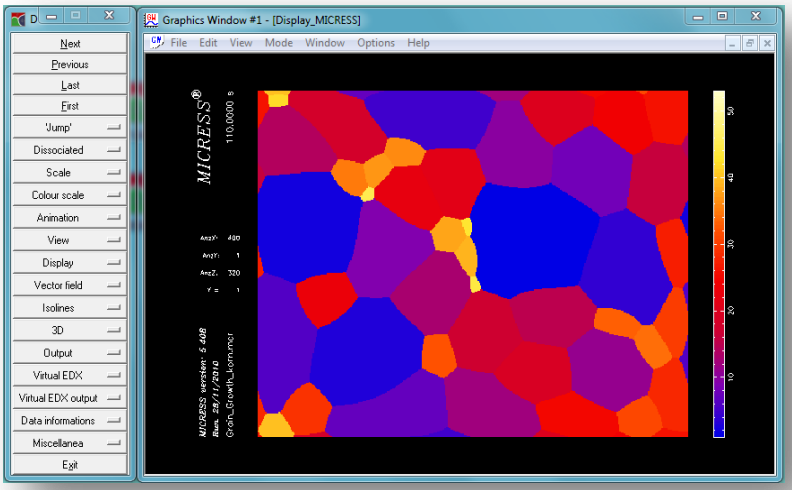


Figure 6.7 The last step of the simulation example, indicating a successful operation of your MICRESS installation without TQ

This process works until you reach the last time step of this specific simulation. You can also simplify this procedure by clicking on “Last” if the simulation was already finished. The window appearing should look like Figure 6.7. In this case the installation was successful and you successfully installed MICRESS®, started a simple example simulation and had a first look at the results.

If you procured a license including Thermo-Calc TQ coupling, it is meaningful to perform the same procedure for a further example. For checking a TQ coupled simulation please use Thermo-Calc-coupled example “Delta_Gamma”. Figure 6.8 shows the Delta_Gamma results. For checking the TQ coupled installation, the “Delta_Gamma_phas.mcr” result is used. After dragging this result file onto the DP_MICRESS, the window should look like the Figure 6.9.

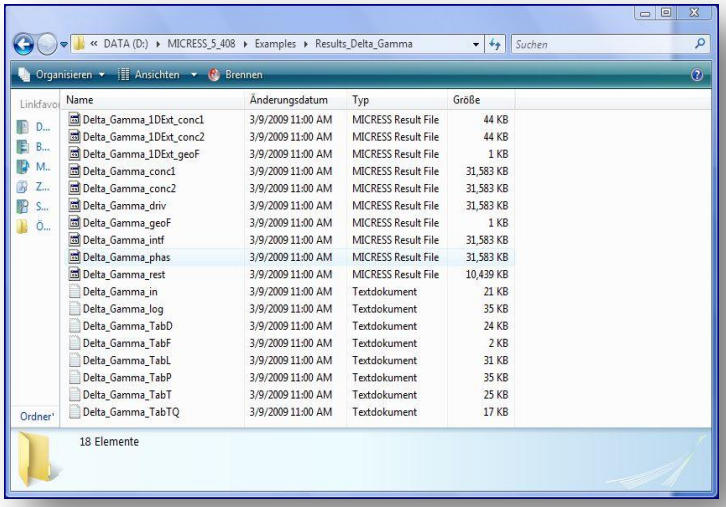

DATA (D:) ▸ MICRESS_5_408 ▸ Examples ▸ Results_Delta_Gamma
Suchen
Organisieren
Ansichten
Brennen
Name
Änderungsdatum
Typ
Größe
Delta_Gamma_1DExt_conc1 3/9/2009 11:00 AM MICRESS Result File 44 KB
Delta_Gamma_1DExt_conc2 3/9/2009 11:00 AM MICRESS Result File 44 KB
Delta_Gamma_1DExt_geoF 3/9/2009 11:00 AM MICRESS Result File 1 KB
Delta_Gamma_conc1 3/9/2009 11:00 AM MICRESS Result File 31,583 KB
Delta_Gamma_conc2 3/9/2009 11:00 AM MICRESS Result File 31,583 KB
Delta_Gamma_driv 3/9/2009 11:00 AM MICRESS Result File 31,583 KB
Delta_Gamma_geoF 3/9/2009 11:00 AM MICRESS Result File 1 KB
Delta_Gamma_intf 3/9/2009 11:00 AM MICRESS Result File 31,583 KB
Delta_Gamma_phas 3/9/2009 11:00 AM MICRESS Result File 31,583 KB
Delta_Gamma_rest 3/9/2009 11:00 AM MICRESS Result File 10,439 KB
Delta_Gamma_in 3/9/2009 11:00 AM Textdokument 21 KB
Delta_Gamma_log 3/9/2009 11:00 AM Textdokument 35 KB
Delta_Gamma_TabD 3/9/2009 11:00 AM Textdokument 24 KB
Delta_Gamma_TabF 3/9/2009 11:00 AM Textdokument 2 KB
Delta_Gamma_TabL 3/9/2009 11:00 AM Textdokument 31 KB
Delta_Gamma_TabP 3/9/2009 11:00 AM Textdokument 35 KB
Delta_Gamma_TabT 3/9/2009 11:00 AM Textdokument 25 KB
Delta_Gamma_TabTQ 3/9/2009 11:00 AM Textdokument 17 KB
18 Elemente

Figure 6.8 Directory with Delta_Gamma results. Delta_Gamma_phas.mcr is used to check the installation.

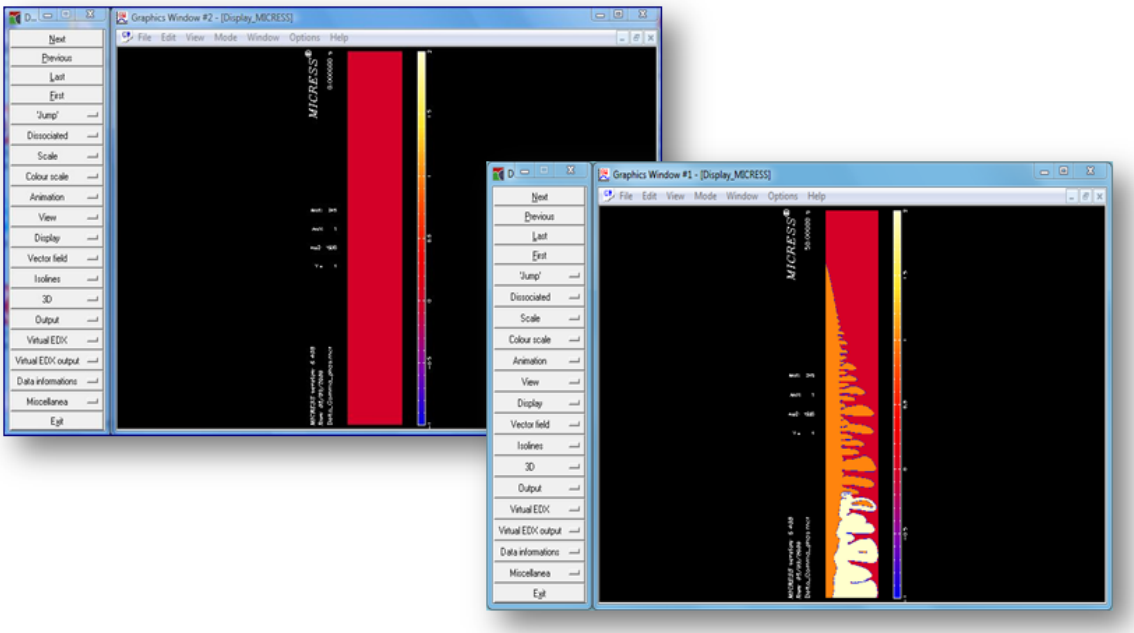


Figure 6.9 The upper window either represents the initial state. The lower picture displays the last time step.

6.4 Getting an existing simulation started under Linux

Although, using MICRESS per drag and drop on the graphical desktop or a file manager is possible like in Windows, it is recommended to work directly on the command line. The different MICRESS versions are located in the 'bin' sub directory of the installation directory. For the default version of MICRESS and MICRESS without Thermo-Calc coupling (e.g. MICRESS 64 bit using TQS on a 64 bit Linux system), scripts are provided to start simulation software: MICRESS.sh and MICRESS_noTQ.sh. On the command line, you can start a simulation by passing the according driving file to one of these scripts:

[path to binary]/MICRESS.sh <[path to driving file]/driving file>

A convenient way to start MICRESS in the driving file directory directly is to use a symbolic link. The red highlighted 'MICRESS' in the MICRESS example directory is a symbolic link to the default MICRESS version or script.

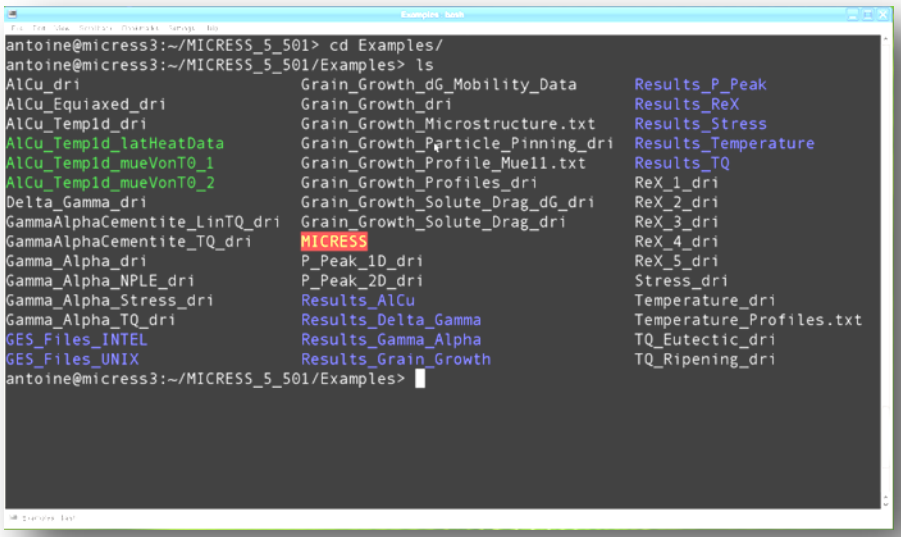


Figure 6.10 Starting a simulation in the MICRESS examples directory

MICRESS uses a couple of dynamically loaded shared libraries. Except the external ThermoCalc and the OpenMP library (libiomp) for the parallel variants, they are all part of a standard Linux installation including the GNU compiler suite 4.4 or above. Check the startup script for MICRESS to see how to set the environment variable 'LD_LIBRARY_PATH' to the path where the library is located. Figure 6.11 shows the error message in case of a missing library.

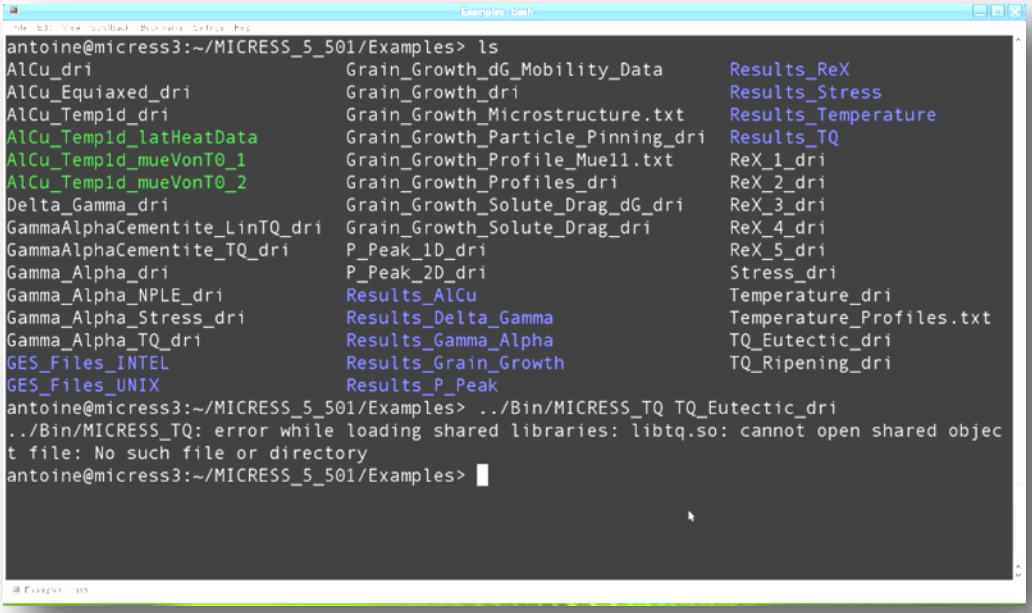


Figure 6.11 The shared library for ThermoCalc coupling is missing.

The setting of the environment variables for licensing (ACMICRES_LICENSE_FILE, resp. LSHOST or LSERVRC) can also be added to these startup script files.

If MICRESS shows a text output like in Figure 6.12, it is installed successfully.

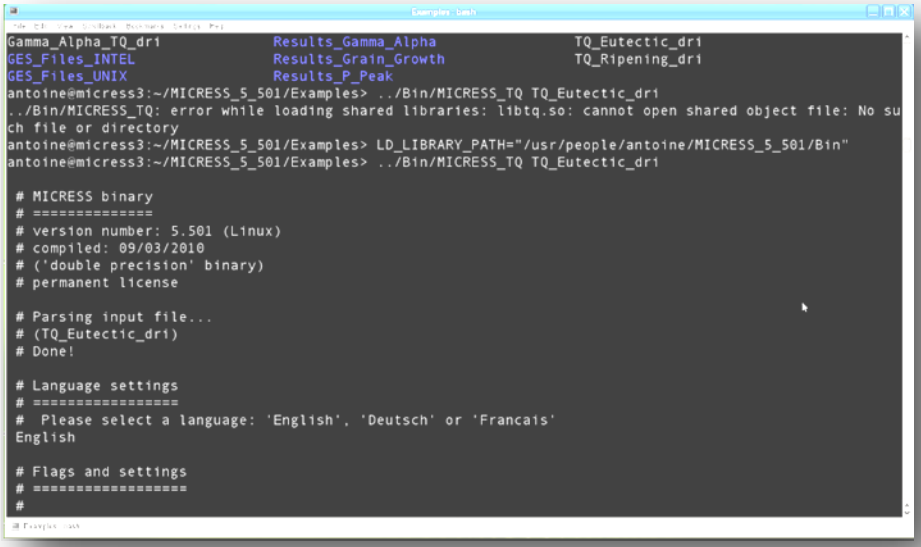


Figure 6.12 A successful start of a MICRESS simulation

7 FAQ's and trouble shooting

Most of the known FAQs have been implemented into the respective sections of the manual and this section thus will evolve dynamically along with future releases of this manual